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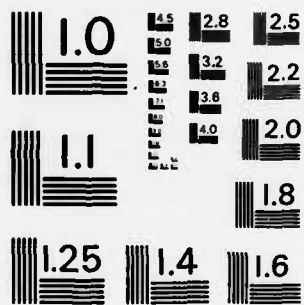
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REPORT TDI-TR-83-2



US ARMY SIGNAL CENTER AND FORT GORDON  
A FEASIBILITY STUDY AND PLAN:  
CONVERTING PASSIVE TO INTERACTIVE VIDEO

JULY 1983

BY

INTERACTIVE TRAINING SYSTEMS, INC.

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A FEASIBILITY STUDY AND PLAN:

CONVERTING PASSIVE TO  
INTERACTIVE VIDEO

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## EXECUTIVE SUMMARY

This is a feasibility study of converting passive video within the Signal Center and Fort Gordon Library to interactive video. The following is a summary of the major sections of this report.

- I. This Section summarizes the rationale and objectives of this study: principally to review a sample of the USASC & Fort Gordon video tape library assessing its potential for conversion to interactive video, and to develop advanced design specifications for adapting two pilot MOS tapes, along with production time and cost estimates.
- II. <sup>here</sup> Retrofitting is the conversion of existing passive video to interactive video. This section argues that this approach has not received serious consideration as a strategy for the creation of large-scale interactive video libraries. The principle advantage of retrofitting is the substantial educational enhancement than can be realized utilizing currently existing video. Economic advantages include significant cost reduction in courseware development and the possibility of rapidly creating a large-scale curriculum of interactive video.

This section details how retrofitting is accomplished, through the use of a high-level authoring system called a formatting system which permits a non-programmer user to rapidly create complex courseware programs with built-in educational design. This process has been proven feasible and effective in a number of recent applications.
- III. Section III demonstrates that it is possible to rate a video tape's potential to be retrofit. We present a model of five levels of potential retrofit and the coding procedure to identify each level. These five Interactive Retrofit Levels (IRL's) are detailed.
- IV. A sample of video tapes was selected from the Fort Gordon Library, representing 10 selected MOS's and other advanced courses. These topics were systematically rated for their potential for retrofitting utilizing the IRL video tape coding system.
- V. Results for the MOS sample show that in 84 percent of the cases, retrofitting is possible without any alteration of the video. The level of retrofitting possible is evenly distributed across most retrofit levels (IRL). Minimal post-production (mainly altering

audio) could substantially enhance these distributions so that a higher proportion of tapes will meet the criteria for the higher and more powerful IRL's. The potential for retrofit appears more related to year of production (improving to a high level after 1976), than it is to MOS content (including maintenance vs. operator).

VI. To illustrate how retrofitting can enhance an existing video tape, two detailed design specifications are presented, for a maintenance MOS (31 E) and an operator MOS (31 M).

VII. & VIII. These sections discuss a number of production issues in retrofitting and make detailed recommendations for Phase II and Phase III. In Phase II, a set of tapes will be retrofitted (detailed task descriptions are outlined). The central purpose of this work would be to integrate retrofit video into MOS instruction, and to perfect the retrofit design through a process of formative research including MOS trainers and students. Phase III involves putting the Phase II design into practice within the context of a full MOS training mission.

## I. Introduction

### Background

The purpose of this contract is to gather data, analyze results, and provide recommendations for the application of interactive technology to existing video materials contained in the Ft. Gordon Video Library. The United States Army and the Department of Defense have been among the earliest proponents of advanced delivery systems for training and instruction. The shift from passive media such as workbooks and video tapes to active media such as interactive video and computer-based training has received substantial support in the U.S. Military.

As more resources have been allotted to these new technologies, the hardware and software problems that were once the focus of concern are falling away. Many successful "demo" systems exist and a wide variety of vendors have the technology under control. This maturation in technical sophistication has led many to recognize that another possibly more challenging task lies ahead, the problem of large-scale courseware development.

If we are to justify deployment of significant numbers of interactive systems, then we must simultaneously make available libraries of interactive courseware for these new technologies. Efficiency in the use of resources will be required to meet this demand, and toward that end Interactive Training Systems, Inc. has committed itself to developing a method of retrofitting existing video tape courseware for use in interactive computer-based systems. This is not a new task for Interactive Training Systems, since we have been involved in this type of work in the private sector for a number of years. Advanced Systems, Inc. the leading video-based training company in data processing has a multi-year large scale contract with ITS to begin "retrofitting" their 10,000 passive video tape library. Time-Life Video, Inc. and the American Management Association have been involved with ITS in similar sorts of work. These companies recognize that a critical mass of high-quality interactive training materials can readily be created by re-utilization of existing video libraries.

These retrofit efforts have been far more than the simple conversion of a video tape from passive mode to interactive. They have involved the redevelopment of the instructional materials and a rethinking of how these new technologies can be integrated into the learning process. They have required the "Formative Research" techniques pioneered by the principals of Interactive Training Systems, Inc. They have also required the skills of the participant groups to insure a successful retrofit effort.

In this spirit, an effort was launched to determine how appropriate the massive library of video materials at Ft. Gordon

are for use in an interactive system. This task required ITS to do the following:

1. Review USASC&FG videotape library of existing Signal operator and maintenance instructional tapes through the selected analysis of representative tapes.
2. As a result of the review of video tapes develop a detailed plan describing the selection criteria to be used in determining candidate tapes for conversion to the interactive format.
3. Recommend pilot MOS (one operator and one maintenance) for possible conversion to the interactive format for the purpose of analysis and validation of the interactive training technique.
4. Justify the selection of the pilot MOS based upon the selection criteria.
5. Develop advanced design specifications to be used in producing the two pilot programs.
6. Provide a description of the research methods used.
7. Provide a description of the estimated production time and costs in producing the two pilot programs.

Having done this work over the past months, it is our belief that the basic materials are in order and that it is time to proceed. We believe this report provides the necessary documentation for this assertion. The task ahead will be to demonstrate this technique to those concerned and press ahead in order to meet our training mission in the 1980's and beyond.



## II. Retrofitting: A Strategy for the Creation of Interactive Video

### What is Retrofitting?

Interactive video training materials can be made in a number of ways. Currently, most projects create both video and software in parallel; video is often developed to take into account the new features made possible by the video disc. This approach places a heavy emphasis on the design of the video, and is proving to be a complex, costly, and time-consuming process. While the final product can be impressive, it is a major project to produce a single video disc. Often the results can be disappointing because a video disc, once mastered, is difficult to reshape.

There is another strategy for producing interactive video -- Retrofitting -- which has generally received little attention. Retrofitting entails the reconstituting of existing video, relying on software to achieve effective interaction, rather than the complex design of new video. (See Figure 1).

The central rationale of the retrofitting strategy is to increase the educational effectiveness of existing video. This passive type of video may be ineffective for a number of reasons:

- o Information transmission may be faster than the average students' ability to comprehend.
- o In complex, technical material, it is difficult for the student to access particular sub-topics in order to view video in a 'pin-pointed' fashion.
- o There is no mastery activity called for by the viewer, nor is the traditional video player capable of 'sensing' such responses by the user.
- o There is no viewer feedback.
- o It is impossible to tell if the viewer is even paying attention to the video.
- o There is no ability to 'test' comprehension of the video, or to track viewer competence.
- o There is no ability to streamline the use of video, and to target a presentation.

In short, existing video images can be underutilized in a passive presentation. By overlaying an interactive program on top of exiting video, it is possible to substantially enhance the

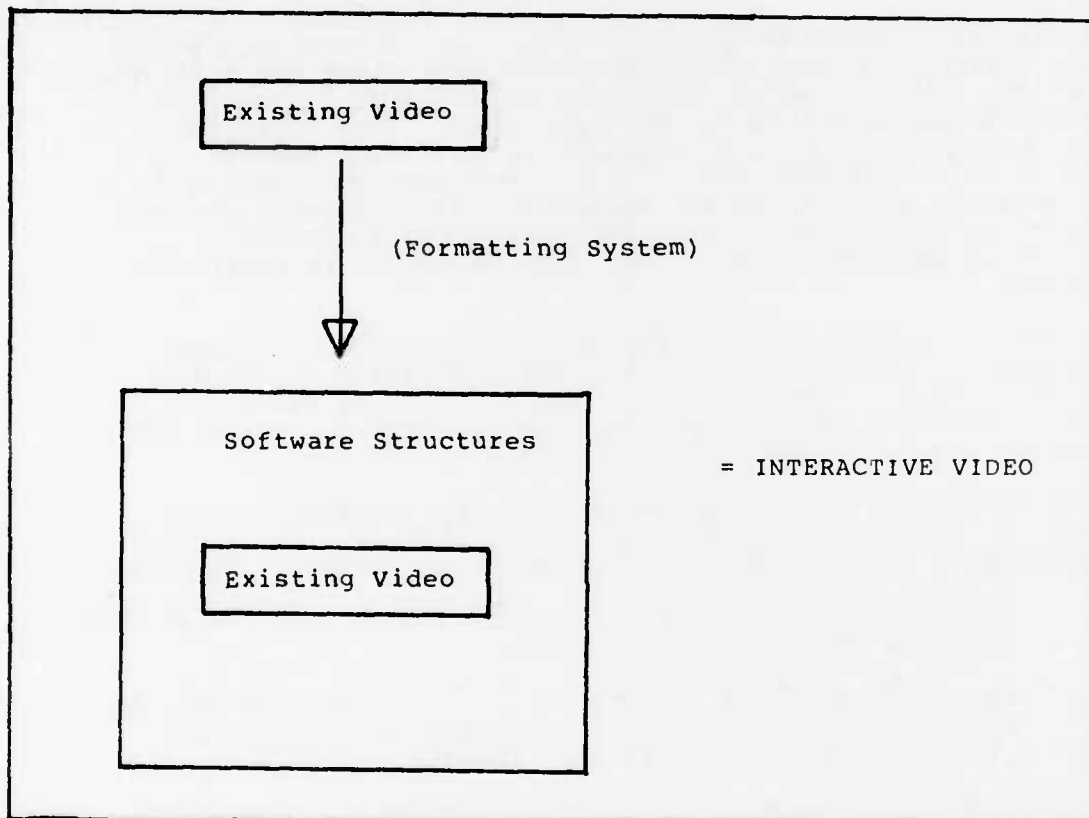


Figure 1. The Retrofitting Process

educational effectiveness of the video, through increasing its appeal and comprehensibility. In this way, retrofitting can get more 'educational mileage' out of existing video material.

#### Advantages of Retrofitting

Educational Advantages. There are numerous educational advantages of an interactive, retrofitted video tape when compared to a passive version. These are:

1. User comprehension is enhanced by:
  - o Making video interruptible so that a user can at any time stop the video and ask questions about what he has just seen, thus controlling the pace and density of information transmission.
  - o Allowing topic replay so that key, specific sub-topics can be viewed repeatedly.
2. Video can be cross-referenced to text. Any topic can be interrupted to get a manual reference.
3. Viewing can be streamlined by a topic advance feature which can jump over materials already mastered.
4. Exercises superimposed on the video can call for mastery activity on the part of the user.
5. Software-based exercises inserted between video segments can provide a competency-based learning system in which user performance is tested and tracked.
6. Feedback and remediation can be made available on a competency basis.
7. Video images of equipment can be used to practice procedural skills in a way which can reduce the hands on time on real equipment.
8. Superimposed learning exercises can be structured to maximize appeal, student involvement and motivation.

Economic Advantages. There are economic as well as educational advantages to retrofitting. The principle production gain is in the utilization of an unrealized asset -- existing video. Passive video, even if it represents the state-of-the-art and the highest production values, can inevitably be enhanced by being made interactive. Since the costs of video production are substantial, making intelligent use of existing video footage can represent a significant cost reduction in the production of interactive video. Furthermore, it is precisely in instances

when passive video production quality is high, that there may be the greatest unrealized asset. Well-created visual images that rapidly flow by in a non-interactive presentation are often the best material for a retrofit in which these shots can be featured and explored as powerful still images.

Cost reduction is not the only economic advantage of retrofitting. Another gain is production time reduction. When existing video can be re-constituted, interactive video materials can be turned out much more rapidly than is otherwise possible. Currently, when a video disc is designed from scratch, the creation of a single disc can be a consuming project. The creation of an entire interactive curriculum of newly created video discs could take many years. By contrast, retrofitting can allow the relatively rapid conversion of an existing video curriculum. Using this strategy it is possible to create an library of interactive training materials in an efficient and timely fashion.

#### How Retrofitting is Done

Retrofitting is accomplished by designing software-based learning exercises which nest with, and maximally utilize, the instructional potential of the pre-existing video. This process is accomplished in the following steps.

1. Video Review: the pre-existing video is coded for its potential in retrofitting. (This procedure is described in Section III).
2. Retrofit Design: an educational learning system is designed to fit the pre-existing video. (An example of this type of design is detailed in Section VI).
3. Software Authoring: through the use of a formatting system, complex software structures can be authored by instructional designers without actually having to program.
4. Testing and Refinement: the retrofitted interactive video program is enhanced through a process of formative research.

#### Relevance of a Formatting System to Retrofitting

A key to the rapid and educationally effective retrofitting of video is a formatting system. This is a special type of high level authoring system. An authoring system is a software program that allows a user to create runtime software packages without actually programming. The user of an authoring system merely answers a series of questions in English, and these answers provide the information necessary to create software to

run specific interactive video 'shows'.

A number of authoring systems exist now. Nearly all are characterized by a requirement that the user build an interactive program out of a series of low level commands (e.g., 'begin playing video', 'stop playing video', etc.). By contrast, a high level authoring system is one in which the user authors in macros and procedures which are much larger and complex building blocks. These high-level building blocks make it unnecessary for the user to enter such simple commands. Instead, with the use of a few commands the user can invoke powerful, pre-existing interactive structures which will run a complex, but small piece of interactive video which we shall call a 'scene'. Authoring in a high level language is primarily a matter of linking together a network of these types of building blocks.

In a formatting system, the building units in a high-level author are of a particular type. Each element is a teaching game structure designed to accomplish a particular type of instruction. There are three families of Format<sup>tm</sup> Software that can be used for different teaching problems: Inquiry, Recognition, and Action. Thus, one authors in a variety of pre-developed teaching structures which are designed with retrofitting in mind. The principle feature which makes these high level elements appropriate for retrofitting is that they are software structures independent of content. The author enters content (both text and video material) with the formatting system. Because of the pre-structured, teaching process designed into the building blocks in a formatting system, retrofitting can be accomplished swiftly and easily. Properly used, this software can dramatically augment the teaching power of existing video in a way that is rapid and cost effective.

### III. Interactive Retrofit Levels (IRL)

#### Assessing Retrofit Potential

Clearly, existing video material varies vastly in its potential for retrofitting. The first step in the process of creating interactive video in this manner is to analyze the potential each video tape has for conversion to an interactive form.

In the present study, the universe of video analyzed is the Ft. Gordon video library. These video tapes are nearly entirely areas in which equipment components are explored and complex procedural skills are demonstrated. Experience has shown that this type of video material lends itself to several distinct types of retrofitting. These types of tape adaptations can be thought of as a hierarchy in which, generally speaking, increasingly complex and sophisticated software learning structures can be overlaid on the pre-existing video. We have termed this hierarchy of potential for conversion Interactive Retrofit Levels or IRL's. These are summarized in Table 1.

#### Descriptions of Interactive Retrofit Levels.

##### Level I: Computer Controlled Segmenting of Video Presentation

IRL I is a type of retrofit in which video material can be better organized for targetted viewing. IRL I is the simplest type of retrofit, and theoretically speaking, the type of adaptation most apt to fit a wide variety of existing video.

This type of adaptation features software structures which aid in the presentation of complex information. For example, Interactive Training Systems, Inc. has developed a number of learning structures which fall into this class:

- o Flag-It\*: allows a viewer to interrupt the video to flag a topic for later review. This learning structure also allows a viewer to replay particular sub-topics, and to receive additional text information.
- o Explain-It\* & View-It\*: are used in explanations of complex procedures. The viewer can interrupt the video to receive more detailed text information about each step in the procedure.
- o Reference-It\*: allows the viewer to interrupt the video to receive cross-referencing to manual pages and paragraphs where a particular procedural step is covered.

Level I retrofits make it easier for the learner to access complex procedural information. The rate at which information is displayed can be controlled. Topics can be assessed directly via a video menu. Instant replay of substeps is possible. Any visual can be cross-referenced to training manuals in a very precise fashion. The user can streamline the use of video, by accessing only the information he wishes to review.

IRL-I Criteria. Video tapes with a high potential for IRL I adaptation are distinguished by one or more of the following features:

1. Linear progression of topics clearly segmented: refers to the flow of the subject matter in the video tape. Does the material flow evenly from topic to topic in a manner and style which can be clearly separated?
2. Logical organization of subtopics: refers to the clustering of main ideas determined in #1 in such a form that they can be divided into organized subdivisions or components of the larger topics. Is there an obvious hierarchy of ideas present?
3. Clear references to supporting documentation: refers to specific verbal or video references within the tape to other teaching or instructional materials, manuals, textbooks, or information sources which may be used by student.

#### Level II: Computer-Inserted Text and Graphics

Video material suited for an IRL II adaptation allows the insertion of text and graphics-based learning exercises within the stream of the video program. These learning exercises can present information, but can also test comprehension and track user competence.

Interactive Training Systems has developed a number of learning exercises which fall into these classes of retrofit. Each exercise can be inserted into video material so that it will play at the end of a particular video segment.

- o Spot-It\*: measures the users ability to identify a critical area, answer a piece of mistaken information in a text or graphics display by touching the screen with a lightpen or a finger (in touch sensitive screen systems).
- o Swap-It\*: tracks a user's ability to identify a critical area or answer, and choose a substitute response, via lightpen or touch screen.
- o Input-It\*: challenges the user to enter correct answers via the keyboard.

IRL-II Criteria. Video which is suitable for an IRL II adaptation is distinguished by some or all of the following characteristics.

1. Good segmentation of key topics: refers to whether subject matter can be broken into logical, sequential segments. Are the topics or ideas presented in such a form that one topic may be selected in its entirety and enhanced so that the material will not appear disjointed?
2. Video pause points for inserts: refers to whether the video is produced in a way that allows for clean interruption so other material and information may be inserted. Does the camera hold the image long enough before the next scene appears? Does the announcer pause briefly during the camera shot so that the video may be interrupted without interrupting the narration?
3. Key ideas testable in text: asks whether the main ideas or information may be tested in text screen format.
4. Audio questions which can be tested in text: refers to questions actually presented by the announcer or featured in the video tape. Can we actually use questions which were already found in the tape by converting them to text format?

Level III: Interactive Video Still-Images

IRL-III refers to video in which clear, close-up still shots can be used as a medium of instruction about instrument controls, indicators and features. In this type of retrofit, software permits the use of the video freeze frame as a new type of teaching and testing structure. The frozen video image is mapped in software so that the interactive system can identify and react to any element in the video image touched by the user.

This type of adaptation is represented by two learning structures developed by Interactive Training Systems, Inc.

- o Explore-It\*: employs a touch sensitive screen and still-framed video, to allow the user to explore a piece of equipment. The user receives detailed text information about any control or indicator which he touches.
- o Identify-It\*: challenges the user to identify particular parts of an instrument by touching them on the screen. This exercise gives the user feedback on errors, and tracks his competence in correctly identifying equipment parts.



IRL-III Criteria. Video suitable for conversion at Interactive Retrofit Level III is distinguished by the following characteristics.

1. Two to five second still shots of graphics, equipment, or instrument panels: refers to the time length of video shots of panels, control surfaces, instrument layouts, and other equipment.

2. Clear closeup shots of graphics, equipment, or instrument panels: refers to the clarity, and specificity of what is being shown in the video image. Does the video provide such clarity that parts may be easily and specifically defined or located?

3. Competing stimuli in still-frame shots: refers to the presence of multiple items shown in the freeze-frame image so that the learner can be challenged to distinguish one item from another. Do the items appear similar enough to reduce the chances of a correct guess?

4. Context shots; such as pan, zoom, and split-screen: refers to the video material which makes it clear which instrument panel or part is being shown and what its relation is to other equipment parts.

#### Level IV: Interactive Video Sequences

This type of video retrofit employs action sequences in an interrupted fashion to step a user through a procedural sequence in order to test his knowledge of that procedure. Typically, this type of adaptation is created out of sequences in which there is audio prompting about a step which is followed by a closeup shot of that step being performed. IRL IV is primarily a type of adaptation that tests understanding rather than presents information.

Examples of the types of learning exercises at this level are the following:

- o Set-It\*: after hearing an audio prompt about the next procedural step, the user is challenged to touch the appropriate control (and sometimes to print out the appropriate setting level). In this way the user demonstrates a knowledge of controls and indicators used in each step. The user then views the appropriate action for reinforcement.
- o Try-It\*: the user must identify the control or indicator used in the next procedural step without audio prompting in order to demonstrate that he understands procedural sequences. When he is correct, he views the next step being performed.

IRL-IV Criteria. Because of the relative complexity of this type of retrofit, the pre-existing video must have a number of attributes.

1. IRL III characteristics: video should possess all the features of IRL III.

2. Audio prompting before video action: refers to whether the presenter states how to do something, prior to showing how to do it. Video which states how to do the task while actually doing it during the description can only be used if the audio track is moved in post-production.

3. Clear progression of procedural steps: refers to the completion of the steps presented to the learner. Does the presenter actually provide all the necessary steps for task completion or does the video tape jump from one step to a later step, omitting some steps in between? Is the learner given a start-to-finish program?

4. Visuals not obscured by actions: is concerned with the clarity of the actual activity. Can the viewer actually see what is happening or does something get in the way of the actual task so that the viewer cannot see the action. When a switch is flipped, a dial set, or something attached, does the camera have a clear shot of that actual execution of the task or should it have been repositioned?

#### Level V: Interactive Scenarios

The most complex type of adaptation is Interactive Retrofit Level V. In this class of conversion, software is used to emulate aspects of an actual situation in which a procedure must be performed. The learner must apply information learned, and make a diagnostic decision. Video sequences and computer-graphics are used to generate a branched scenario in which the user's competence is tested by his ability to troubleshoot, find and fix problems as they emerge in a mini-case.

At this IRL, the principal learning exercise used by Interactive Training Systems, Inc. is the following.

o Action-Maze\*: is a branched scenario in which video, combined with computer-generated text and graphics, is used to create a scenario with imbedded problems. The user must find and fix these problems. If he does, he proceeds to a new branch of the scenario in which the last problem is fixed, but a new one is imbedded.

IRL-V Criteria. Video suitable to retrofit at Level V must exhibit still another set of critical features.

1. Sufficient trouble-shooting information: refers to the available amount of diagnostic information which may be used by the learner to solve problems. Does the information given actually suggest problems which may be presented to the user to test for learning. Can a problem be offered so that the student is able to make a diagnosis and decision based on that diagnosis?

2. If-Then statements in narrative: refers to actual remarks by the presenter that detail specific consequences of an action or inaction. Good If-Then statements allow for the interactive system to issue the IF portion and to request the learner to provide the THEN response.

3. Diagnostic actions depictable in graphics screens: refers to the ease with which the diagnostic activity can be depicted in a graphics screen.

4. If-Then visuals: refer to the completion of the video tape presentation. Ideally, both sides of the cause-and-effect situations will be demonstrated. Does the video tape actually show the cause and consequence of the action or the inaction.

#### Coding Interactive Retrofit Levels (IRL)

The five IRL's described above can be coded in any given video tape, using the criteria specified in the preceding section. Coding yields an estimate of the potential for any video tape to be retrofit. More specifically, the rating also suggests exactly which software structures should be used to achieve the retrofit, employing a formatting system (described in Section II). In short, an accurate coding of IRL implies a great deal about the pedagogical design which is possible in a final interactive conversion without alteration of the preexisting video. The coding of IRL is accomplished in the following steps:

1. Two coders view a given video tape, and check off IRL criteria employing the coding form on the page which follows (See Table 2).

2. Each IRL is coded and assessed independently.

3. Each coder assigns a potential rating at each IRL based on the presence of the key IRL criteria. (A = Excellent (all criteria present); B = Very Good (most criteria present); and C = Acceptable (minimal criteria present to allow a retrofit; could be enhanced with post-production)).

4. Coders compare ratings and, where they differ, reach a joint rating based on a discussion of the tape.

This coding procedure was applied to a sample of video tapes in the Ft. Gordon Library, as described in the next Section. The procedure is sufficiently exact to permit a rapid but accurate assessment of the potential for retrofitting using a formatting system to produce interactive video training materials out of a set of pre-existing video tapes.

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TABLE 1  
Interactive Retrofit Levels

<u>Level</u>	<u>Educational Use of Interaction</u>
IRL I  Computer-Controlled Segmenting of Video Presentation	<ul style="list-style-type: none"> <li>o Targetted access of procedural steps</li> <li>o Cross-referencing video to text in manuals</li> <li>o Text elaboration of video presentation</li> <li>o User control of rate of information presentation</li> <li>o Instant replay by menu control</li> <li>o Topic advance features</li> <li>o Interruptable video</li> </ul>
IRL II  Computer-Inserted Text and Graphics	<ul style="list-style-type: none"> <li>o Text and graphics based Learning exercises which test user knowledge and competence</li> <li>o Related feedback and remediation</li> </ul>
IRL III  Interactive Video Still-Image	<ul style="list-style-type: none"> <li>o Exploration of video still-images to receive more detailed text explanation regarding function</li> <li>o Gamelike use of video still-image to test user knowledge of instrumental parts, indicators and controls.</li> <li>o Related feedback and remediation</li> </ul>
IRL IV  Interactive Video Sequences	<ul style="list-style-type: none"> <li>o Gamelike testing of users competence in identifying equipment parts, controls, or indicators used in a particular procedural step</li> <li>o Gamelike testing of users comprehension of sequencing of steps (and related equipment parts, controls, or indicator) in a given procedure</li> <li>o Related feedback and remediation</li> </ul>
IRL V  Interactive Scenarios	<ul style="list-style-type: none"> <li>o Gamelike practice of Diagnosis and troubleshooting</li> <li>o Tracking of user competence in diagnosis and troubleshooting</li> <li>o Related feedback and remediation</li> </ul>

#### IV. Sampling of the Fort Gordon Library

##### Criteria for selecting MOS's

This contract called for Interactive Training Systems, Inc. to review video tapes reflecting a minimum of 10 MOS's. It was necessary, before a video tape criteria selection could be compiled, that Interactive Training Systems, Inc. obtain Ft. Gordon input regarding the MOS selection.

Drs. Harry Lasker, David Lubin, and Lawton Bourn travelled to Augusta just prior to Thanksgiving, 1982 to meet with appropriate USASC & Fort Gordon personnel. The Fort Gordon personnel consisted primarily of the following people: Robert Seaman, Contract Coordinator, Directorate of Training Developments (DTD); Dan Danilovich, Chief, Communications Electronic Branch, Design and Development Division (DDD) of the DTD; Major Doug Dooley, Chief, Educational Television Branch (ETV); and Don Forsyth, Training Developments Institute (TDI), Fort Monroe, VA.

ITS and Fort Gordon staff met for two days, discussing various Army Signal Center training programs, video tape materials used in those training programs, and the relevancy of some MOS's compared to others. The primary Ft. Gordon input centered on which video tapes should be considered because of their relevancy and viability, programs which would soon be phased out or be replaced, the importance of video tapes within MOS's, the content nature of the video tapes, and related training materials used in conjunction with the courses and video tapes. By the end of the first meeting day, ITS had enough information about course offerings, video tapes used in those courses, available training manuals (TM's) and Program of Instruction (POI) needed to develop a general list of MOS's to be presented and discussed with USASC & Ft. Gordon officials. From the extensive quantity of information, ITS developed the following primary criteria for selecting MOS from which to sample videotapes.

- o Centrality and relevance to curriculum
  - Frequency of use
- o Life Expectancy
- o Representativeness of other courses
  - Types of training
  - Level of training
  - Subject matter
- o Video Traits
  - Amount of video
  - Video production quality
- o Up-to-date curriculum design

Using these criteria, the video tape sampling was narrowed to 10 MOS's.

#### Procedure for sampling videotapes

Once a satisfactory list of MOS was established, the sampling of video tapes began. ITS grouped the titles and numbers of all available video tapes for each of the 10 MOS's selected for review. We screened this list to remove tapes which were no longer used. Next we drew a random sample of tapes from the remaining list, attempting to sample equally across different dates of production. The video tapes were readily available from the library in the Ft. Gordon television unit and quantities were brought to a convenient previewing room nearby. ITS had been extended the highest courtesies viewing video materials at Ft. Gordon.

#### Coding methodology

Two, and sometimes three ITS viewers would watch each of the video tapes in its entirety, and then individually and separately code the video tape according to the criteria on the IRL coding sheet ' based on the IRL scheme in Section III. Following each separate evaluation, designed to establish inter-rater reliability, the raters would confer and compare notes to determine the general direction and nature of each others' assessments. This process continued for three man weeks until a total of 79 video tapes representing all 10 MOS's were reviewed and evaluated.

The raters viewed the video tapes for certain characteristics in many areas. These included the way in which the subject matter was presented, and the quality of the video tape ranging from technical production aspects to artistic and imaginative characteristics. Using the IRL coding sheet, each rater would assign an A, B, or C to each video tape in one or more of 5 IRL levels. Theoretically, a video tape evaluation could range from a non-acceptable (N/A) to a maximum of 5 A's or one in each level. In addition to the letter value assigned, each level received appropriate checkmarks indicating that certain features or characteristics of each level were found or noticed in that particular video tape. In general the number of checkmarks reflect the possible assigned values, although the checkmarks technically connote only the existence of certain features and do not denote quality.

#### An example

An example of a video tape and its evaluation might be helpful to illustrate the point. Video tape #101-113-2499B is used with a course offered in MOS 31E. The exact subject matter of this particular video tape concerns alignment procedures for

specific communications equipment. This video tape received 3 A's in levels I, II and III from one rater and 2 A's in levels I and III plus an A- in level II from another rater. Not surprisingly, the rater who gave the tape all A's also had two more check marks than the other rater.



## V. Findings

### Overall Results

The ratings of the topics sampled from the Ft. Gordon Library can be tabulated to give some general estimates of the potential for retrofitting.

General potential for retrofitting. As outlined in the previous section, the seventy-nine MOS video tapes sampled do not constitute a representative sample of the Ft. Gordon Library, but should be representative of 10 selected MOS's. All statistics presented in this section must be understood to refer to this subdomain of the Ft. Gordon Library as sampled by the procedures described in the previous section.

We have described in Section III the process by which each tape was assessed at five IRL's, and could receive one of four classification's at each level:

#### IRL Rating:

- A : Excellent potential for retrofit with no alteration of video. All IRL criteria met at the level in question.
- B : Very Good potential for retrofit with no alteration of video. Most IRL criteria met.
- C : Acceptable potential for retrofit. Critical IRL criteria present. Retrofit would be enhanced by minor post-production alterations which do not entail re-shooting of video.
- None : No potential for retrofit at a given IRL.

An initial finding is that a very high proportion of video tapes show some potential for retrofitting. In the MOS sample, eighty-four percent of the tapes showed some potential (a rating of C or better) at some IRL (at least one). (See Table 1).

Of the IRL ratings given, the preponderance of ratings were at the high end of the scale. 'A' ratings occurred in forty-five percent of instances, 'B' in forty-eight percent and 'C' in only six percent. In effect, this means that most of the IRL potential in the MOS sample was of the type requiring no significant post-production.

IRL I. As Table 2 shows, nearly three-fifths of the topics in the MOS sample showed a potential for retrofit at IRL I. Thirty-five percent received an 'A' rating and twenty-three percent a 'B' rating. 'C' ratings were very infrequent. This overall pattern confirms that IRL I adaptation, involving computer control of segmenting of video material, is indeed the most widespread type of retrofit potential.

IRL II. This adaptation appears possible in about one-third of the cases. 'B' level ratings outnumber 'A' ratings twenty-five percent to nine percent.

IRL III. This class appears possible with essentially the same frequency as IRL II, almost forty percent of the cases. Here, 'A' level ratings outrank 'B's, eighteen percent to sixteen percent.

IRL IV. In about one-quarter of the cases, this kind of retrofit appears feasible. 'A' and 'B' ratings are fairly evenly matched.

IRL V. This kind of retrofit appears infrequently. This is primarily because we used very strict coding criteria for this IRL, one in which a video-based scenario segment was necessary. If production of scenarios could be more text and graphics based, this type of retrofit would have been possible in a preponderance of cases.

Retrofit Distribution. If we discard 'C' ratings which involve some degree of post-production, the final percentages suitable for retrofitting at various IRL's is given in the right-most column of Table 3. This distribution of percentages is consistent with the view of IRL's as a relative hierarchy: IRL I is more frequent than IRL II and III, and they, in turn are more common than IRL IV and V. This pattern is not surprising since, as we have seen in Section III, IRL criteria became more complex and demanding at higher levels.

It is important to stress that this hierarchy is not perfect. Some topics are suitable for a high-level retrofit, while they are not appropriate for a lower-level conversion. The statistics on these patterns can be found in Table 4. In this tabulation, the percentage of cases matching the IRL hierarchy is shown at the highest level of classification for a tape. To match the hierarchy a tape would have to be rated in the fashion depicted in Figure 1, in which a '+' corresponds to an 'A' or a 'B' rating.

Highest Overall Classification	Rating at each IRL Level				
	IRL I	IRL II	IRL III	IRL IV	IRL V
IRL I	+				
IRL II	+	+			
IRL III	+	+	+		
IRL IV	+	+	+	+	
IRL V	+	+	+	+	+

Figure 1  
'A' and 'B' Rating Correlation to IRL Levels

In Table 4, any given tape was classified as a mis-match to the hierarchy if a single '+' expected rating was absent. Not suprisingly, mismatched percentages generally increase by highest IRL classification. This pattern can be seen by perusing data in Appendix B.

Highest IRL Classification. Any topic can be given a single IRL classification in terms of the highest retrofit level for which it was given an 'A' or 'B' code. Using this approach, it is possible to envision a distribution of retrofit types for the MOS sample. Tabel 5 presents these classifications in tabular form, including a cumulative index of percentages of tapes classed in each category. The same data is present in graphic form in Figure 2. Classed in this fashion, seventeen percent of cases could be coded at IRL I alone, not higher than twenty-one percent at IRL II, twenty percent not higher than IRL III, twenty-one percent not higher than IRL IV and roughly three percent at IRL V. Taken together, these patterns suggest considerable potential for retrofitting using pre-existing video in the Ft. Gordon Library.

SOAC/SOBC Sample. In addition to the MOS sample, we assessed tapes drawn from SOAC (Signal Officer Advanced Course) and SOBC (Signal Officer Basic Course). Table 6 presents the results of this sampling. The patterns we observed in this set of video tapes was distinctly different than in the MOS sample. No tapes were suitable for adaptation above IRL III. No tapes were classed at an 'A' level at IRL's I to III. There appears to be something which distinguishes the video production values of these two sets of tapes. We shall explore these patterns in examining IRL ratings by date of production.

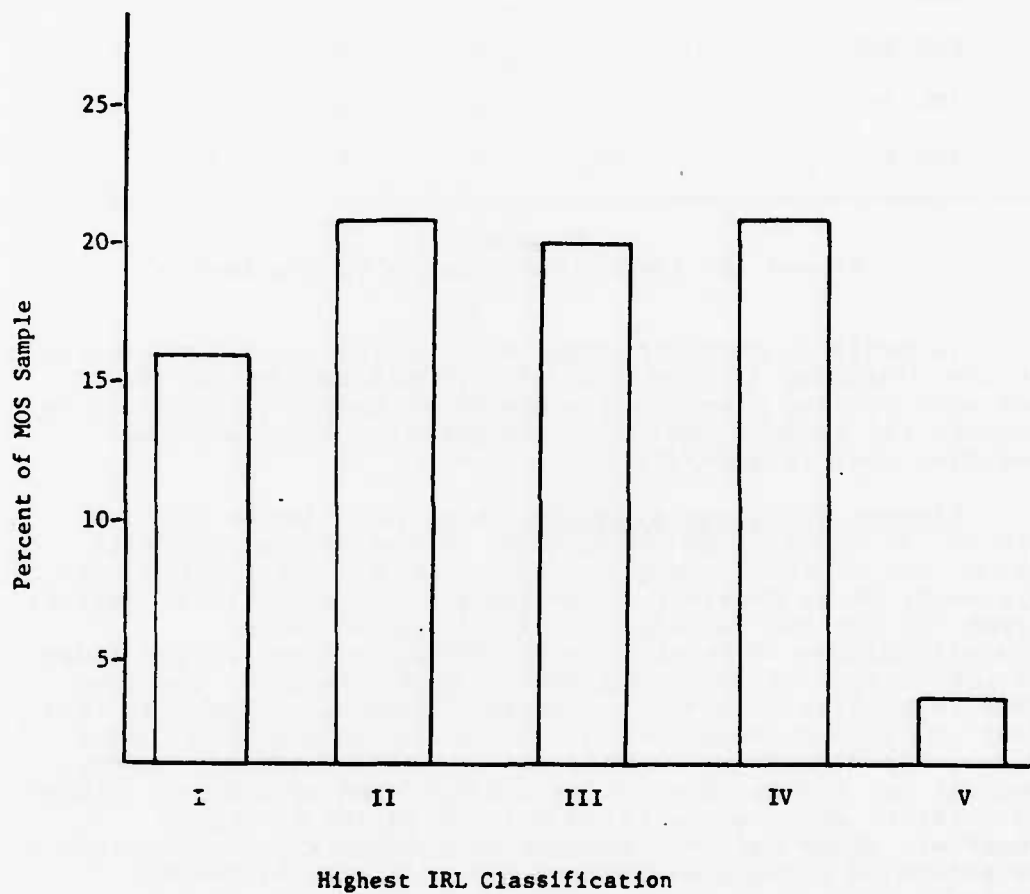


Figure 2 Distribution of MOS Sample by Highest Potential IRL Classification

### Results by Date of Production

A principle factor that accounts for differences in IRL rating in the MOS and SOAC/SOBC samples is the date of production. The latter tapes were produced generally between 1963 and 1973, while the former sample was heavily concentrated in the period from 1975 to 1982.

Table 7 makes it clear that date of production is related to the highest IRL classification. Frequent ratings at IRL III and above do not appear until production dates of approximately 1976. Most recent productions, while obviously being superior in general production values, do not show a radically different IRL distribution from tapes in the 1976-1979 period.

### IRL Variation by MOS

Data show that there is not significant variation by MOS in terms of overall distribution of IRL ratings. Table 8 compares the highest IRL classifications for operator and maintenance MOS's. The distribution is very similar in each group, suggesting that IRL rating is not highly affected by the content or type of the MOS. Overall variation in IRL distribution between MOS's appears to be more an effect of date of production than of any other major factor.

### Summary

There appears to be a considerable potential for retrofitting in the Ft. Gordon Library, as seen through the MOS sample. Eighty-four percent of these tapes showed potential for retrofitting. Of this group ninety-four percent could be retrofit without post-production in the video.

The IRL ratings do appear to constitute something of a hierarchy: the higher the rating, the less frequently it is observed. Still, in terms of highest IRL rating, approximately twenty percent of the MOS sample was classed at each IRL from I to IV, indicating the considerable concentration of potential for retrofitting at higher IRL's. Potential for adaptation at IRL V would have been considerably higher if text and graphics were rated as the basis for scenarios.

The SOAC/SOBC produced distinctly poorer IRL ratings, both in level and grade. This appears to be a primary result of date of production, with older productions receiving significantly lower ratings. The most important shift in production technique affecting IRL rating appears to have

occurred about 1976.

Date of production appears to be a more important factor shaping IRL than does the content of video materials. Maintenance and operator MOS's receive very similar IRL distributions.

Table 1  
Summary of IRL Ratings  
(MOS Sample)

Suitable for Retrofit (A, B or C rating) : 84% (66)

Not Suitable for Retrofit ('None' rating): 16% (13)

Of all ratings of IRL's in MOS Sample:

A ratings	45.3%	(58 instances)
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B ratings	48.4%	(62 instances)
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C ratings	<u>6.3%</u>	( 8 instances)
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100.0%

TABLE 2  
BREAKDOWN OF IRL RATINGS  
(MOS SAMPLE)

N = 79

<u>IRL</u>	TYPING VALUE: A	TYPING VALUE: B	TYPING VALUE: C	TYPING VALUE: NONE
I	28 OR 35%	18 OR 23%	1 OR 1%	32 OR 41%
II	7 OR 9%	20 OR 25%	2 OR 3%	50 OR 63%
III	14 OR 18%	13 OR 16%	3 OR 4%	49 OR 62%
IV	8 OR 10%	10 OR 13%	1 OR 1%	60 OR 76%
V	1 OR 1%	1 OR 1%	1 OR 1%	76 OR 97%

TOTAL NUMBER AND PERCENTAGE OF  
EACH VALUE PER IRL LEVEL



TABLE 3  
SUMMARY OF "A" & "B" RATINGS  
(MOS SAMPLE)

N = 79

<u>IRL</u>	TYPING VALUE: A	TYPING VALUE: B	TYPING VALUE: A + B
I	28 OR 35%	18 OR 23%	46 OR 58%
II	7 OR 9%	20 OR 25%	27 OR 34%
III	14 OR 18%	13 OR 16%	27 OR 34%
IV	8 OR 10%	10 OR 13%	18 OR 23%
V	1 OR 1%	1 OR 1%	2 OR 2%

TAPES ACCEPTABLE FOR RETROFITTING  
WITH A AND/OR B ASSIGNED VALUE  
PER EACH IRL LEVEL

Table 4  
Analysis of IRL Hierarchy  
(MOS Sample)

Highest Level of Classification	Missing Lower Element	Matches Hierarchy	
IRL I	0% (0)	100% (14)	14
IRL II	31% (5)	69% (11)	16
IRL III	79% (11)	21% (3)	14
IRL IV	50% (8)	50% (8)	16
IRL V	100% (2)	0% (0)	2
	26	36	62

TABLE 5

## SUMMARY OF HIGHEST IRL CLASSIFICATION

(MOS SAMPLE)

N= 79

HIGHEST IRL PER TAPE	NUMBER OF TAPES	PERCENTAGE	CUMULATIVE PERCENTAGE
IRL I	13	16%	
IRL II	16	20%	36%
IRL III	16	20%	56%
IRL IV	18	23%	79%
IRL V	2	3%	82%
NOT ACCEPTABLE FOR RETROFITTING	14	18%	100%

TABLE 6

## SUMMARY OF IRL RATINGS

(SOAC/SOBC SAMPLE)

N = 14

<u>IRL</u>	TYPING VALUE: A	TYPING VALUE: B	TYPING VALUE: C	TYPING VALUE: NONE
I	0 OR 0%	5 OR 36%	8 OR 57%	1 OR 7%
II	0 OR 0%	10 OR 71%	3 OR 21%	1 OR 7%
III	0 OR 0%	2 OR 14%	5 OR 36%	7 OR 50%
IV	0 OR 0%	0 OR 0%	0 OR 0%	14 OR 100%
V	0 OR 0%	0 OR 0%	0 OR 0%	14 OR 100%

TOTAL NUMBER AND PERCENTAGE OF  
EACH VALUE PER IRL LEVEL

Table 7  
Comparison of IRL Classification by Production Date  
(MOS Sample)

Date of Production	Highest IRL Classification <sup>1</sup>						Total
	I	II	III	IV	V	None	
1969-75	19% (5)	31% (8)	7% (2)	12% (3)	0% (0)	31% (8)	100% (26)
1976-82	17% (9)	15% (8)	24% (13)	23% (12)	4% (2)	17% (9)	100% (53)

<sup>1</sup>Above a 'C' rating.

Table 8  
Comparison of Highest IRL Ratings by  
Type of MOS  
(MOS Sample)

Type of MOS	Highest IRL Classification <sup>1</sup>						Total
	I	II	III	IV	V	Other	
Operator	30% (18)	16% (10)	21% (13)	20% (12)	3% ( 2)	10% (6 N/A)	61
Maintenance	38% (28)	23% (17)	19% (14)	10% ( 7)	10% ( 0)	10% (7 N/A)	73

<sup>1</sup> Above a 'C' rating.

## VI. Detailed Retrofit Design

### A. Introduction

In order to demonstrate how the adaptation process begins, this contract calls for a detailed design specification for the retrofitting of two MOS video tapes. The design specifications are given in this section in fairly great detail so that a reader unfamiliar with flow diagram specifications can cross reference these charts to text descriptions of particular parts of the interactive program.

This section begins with a brief summary of the selection criteria used for the two topics which were chosen. Next comes a lengthy description of each proposed retrofit design. In each of these specifications there is a general explanation, accompanied by a general diagram, of each component of the retrofitted program. Next, there is a general description of each interactive element used in each section. These are the learning exercises which are explained in terms of their educational objective, a brief description of how that element would work, and a summary of user options. These descriptions include the learning exercise names used in the formatting system of Interactive Training Systems, and a cross-referencing to the IRL level.

Following these general descriptions is a series of screen descriptions indexed to the master flow diagram for each design. These screen specifications are labelled with a number (e.g., 1.0, 1.1.1, 1.1.4 etc.) that corresponds to a box in the master flow diagram. Each screen has user options, which are Action Boxes that allow the user to move from that location in the interactive system to another discrete location. The screen specification describes exactly the screen destination of any given Action Box on any given screen in the entire interactive design.

The combination of the graphic and textual presentation of the retrofit designs should make it easier for a reader with little interactive design experience to envision the architecture of the proposed video adaptation. We should note, however, that for purposes of presentation in this report these specifications have been made in much greater detail than they would normally have been. Often, flow diagrams are sufficient to use a formatting system to retrofit the video tape (as described in Section II).

Design Assumptions. The two design specifications (in parts B and C of this Section) were based on the developed architecture. It is expected that some of these assumptions will have to be revised when the tapes are reconstructed for the specific courses. At the time of retrofit the designer will be in close communication with an instructor or content expert; therefore, further assumptions will no longer be necessary.

#### Assumptions for Design I

1. All necessary prerequisite material has been mastered so no pretest or preliminary assessment is included.
2. The user is unfamiliar with the information on the video tape, therefore, every topic should be presented.
3. The design goal is to maximize learning since "time-on-equipment" is at a premium.
4. The user will be allowed to plan his actions through the module.

#### Assumptions for Design II

1. It is not known whether the student has mastered all necessary prerequisite material. Therefore, review and an assessment is included.
2. It is not known whether the student is familiar with the information to be presented on the video tape. The assessment will help him determine what topics he needs to study.
3. "Time-on-equipment" is at a premium so the design goal is to maximize learning with a minimum amount of time spent on the actual equipment.
4. The user will be allowed to chart his own path through the module.

Selection of MOS tapes. The two video tapes chosen for a detailed retrofit design specification were selected for several major reasons.

1. Part of the MOS sample: The tape had to have an IRL rating.
2. High IRL ratings: Both tapes had 'A' level ratings at IRL levels I through IV.
3. Representativeness of different MOS's: Both maintenance (31E) and operator (31M) MOS's are represented.
4. Current use: The tapes were required to be currently used in instruction.
5. Maximizing other video production values: More recent video production has substantially enhanced production values which make them more visually appealing for retrofitting.



Using these five selection criteria tapes #2494 (MOS 31E) and #2141 (MOS 31M) were selected for the retrofit specification which follows.

B. DESIGN I: Tape 2141 (MOS 31M; Operator). Introduction to Radio Set AN/GRC-50: Cables and Presets.

1. Overall Design

a. Instructional Section

In the Instructional Section, the user receives course material via video and text. This system enables the user to access specific video segments of interest and to replay these segments. On various still screens he can touch the dials, buttons or switches to find out what they are and their purpose. Throughout this section, the user is able to reference page numbers in his technical manual that correspond to the topics being presented.

b. Practice Section

The Practice Section gives the user the opportunity to apply the knowledge he has gained from the Instructional Section. He can try to identify the buttons, dials and switches on various still screens, and he can determine which procedure he is seeing performed after viewing a segment of it. The user may select a procedure that he wants to attempt to do. He will view a portion of it, then he will be told what step must follow. He will strive to touch the appropriate switch and to specify the correct setting.

In addition, the user shall have the opportunity to answer comprehension questions based on the important facts in the module. If he makes an error on any exercise in the Practice Section, instructional messages will appear on the screen to aid him in correcting his mistakes. He will be able to practice an exercise as many times as he wishes.

From each exercise in the Practice Section, the user can obtain reference page numbers in his technical manual corresponding to the task, procedure or information he is trying to apply. Periodically, while practicing, he will be able to check a histogram to see how well he is performing the various competencies of the module. After he has a good understanding of the components and procedures he can practice all of the tasks on the actual equipment while being guided with step-by-step video examples.

c. Test Section

In the Test Section, the user is tested on the general information, components and procedures that were presented and practiced in the course. He must identify the switches, buttons and dials on various still screens. He has to specify which procedure was performed after viewing a short portion of it. Once he has seen a segment of a procedure, he

will be told to do the next step. He will have to touch the correct dial or switch and set it correctly. The user must answer comprehension questions that pertain to the facts of the course. He will have one opportunity to take each test. Once he begins a test, he can not exit until he is finished.

Finally, for each competency, the user's results will be kept on a histogram. When he passes all of the competencies he will go to his instructor for a Mastery Test (hands-on). If he does not complete the mastery test satisfactorily he should review specific material that he failed.

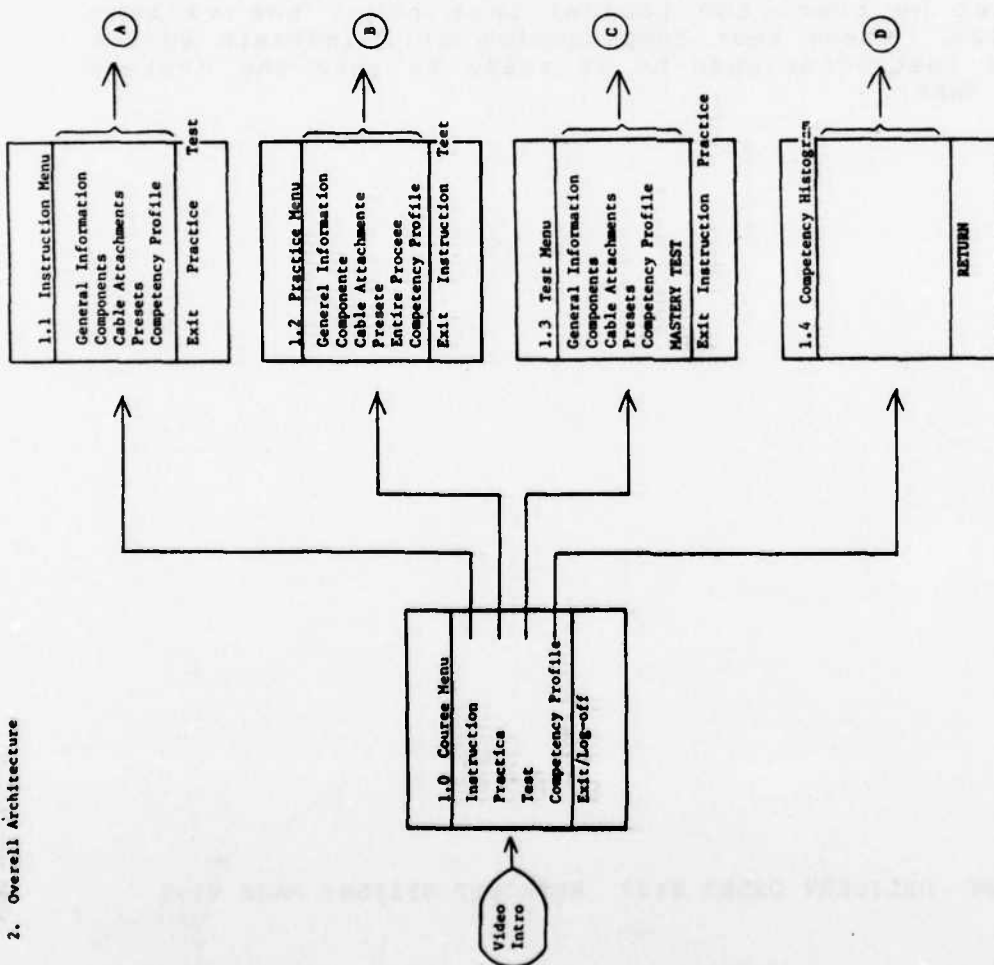
#### d. Competency Profile Section

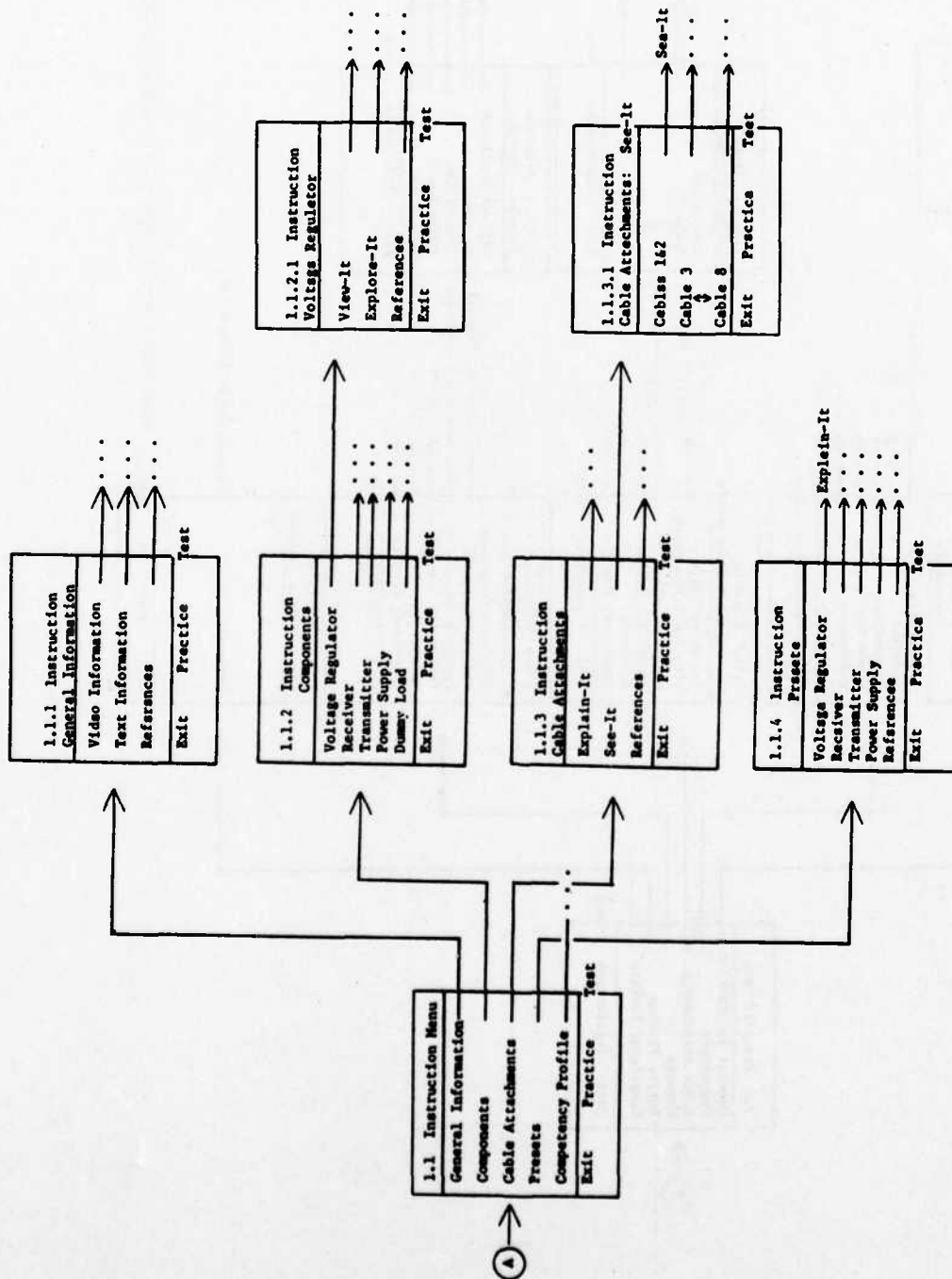
In the Competency Profile Section, the user will check a histogram to see how well he performed the course competencies. There are two groups of competencies: Practice and Test.

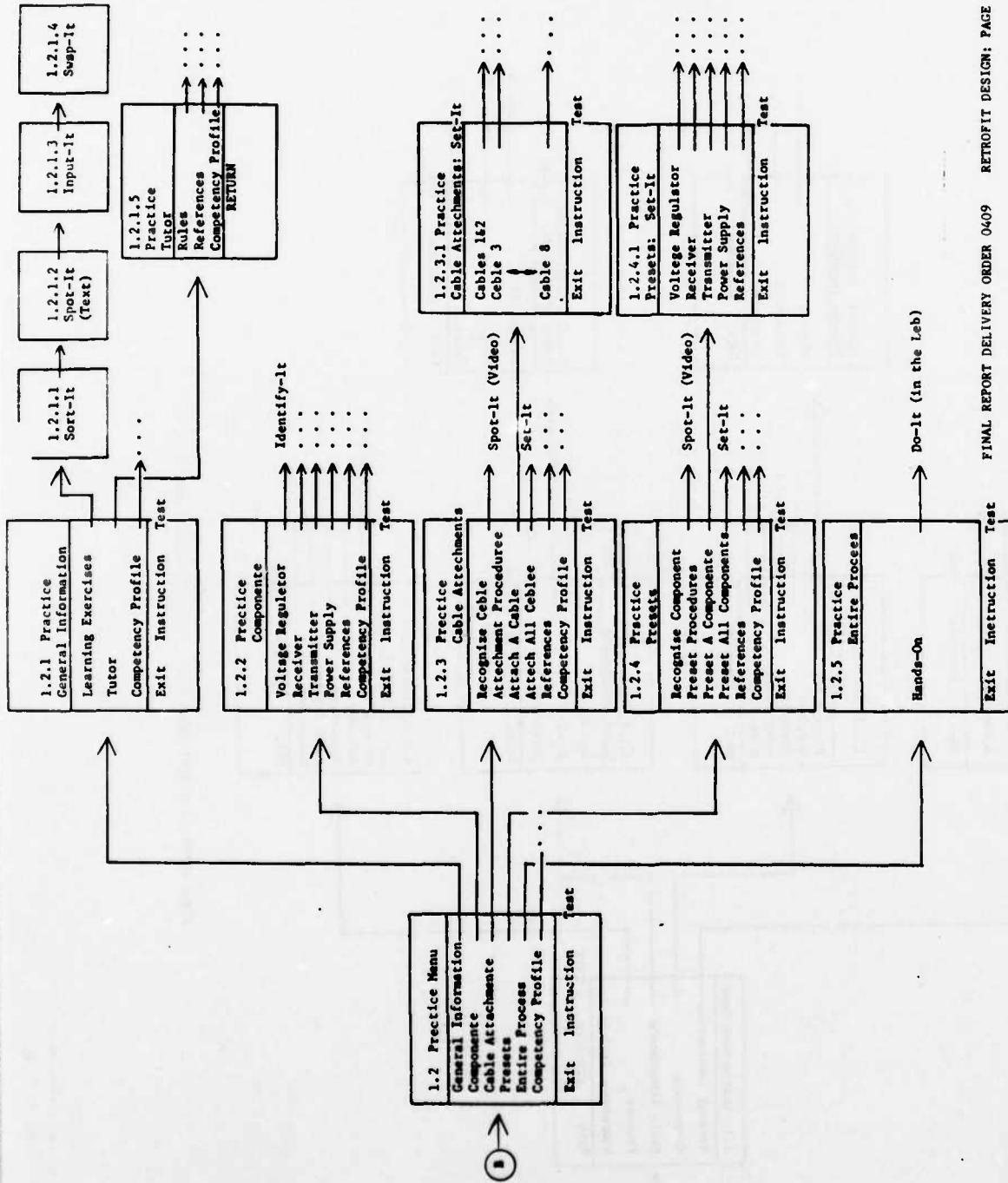
The Practice Competencies will reflect the user's progress as he attempts to apply the information he is learning. He will be able to see which competencies he is good at and which ones he needs to work on more.

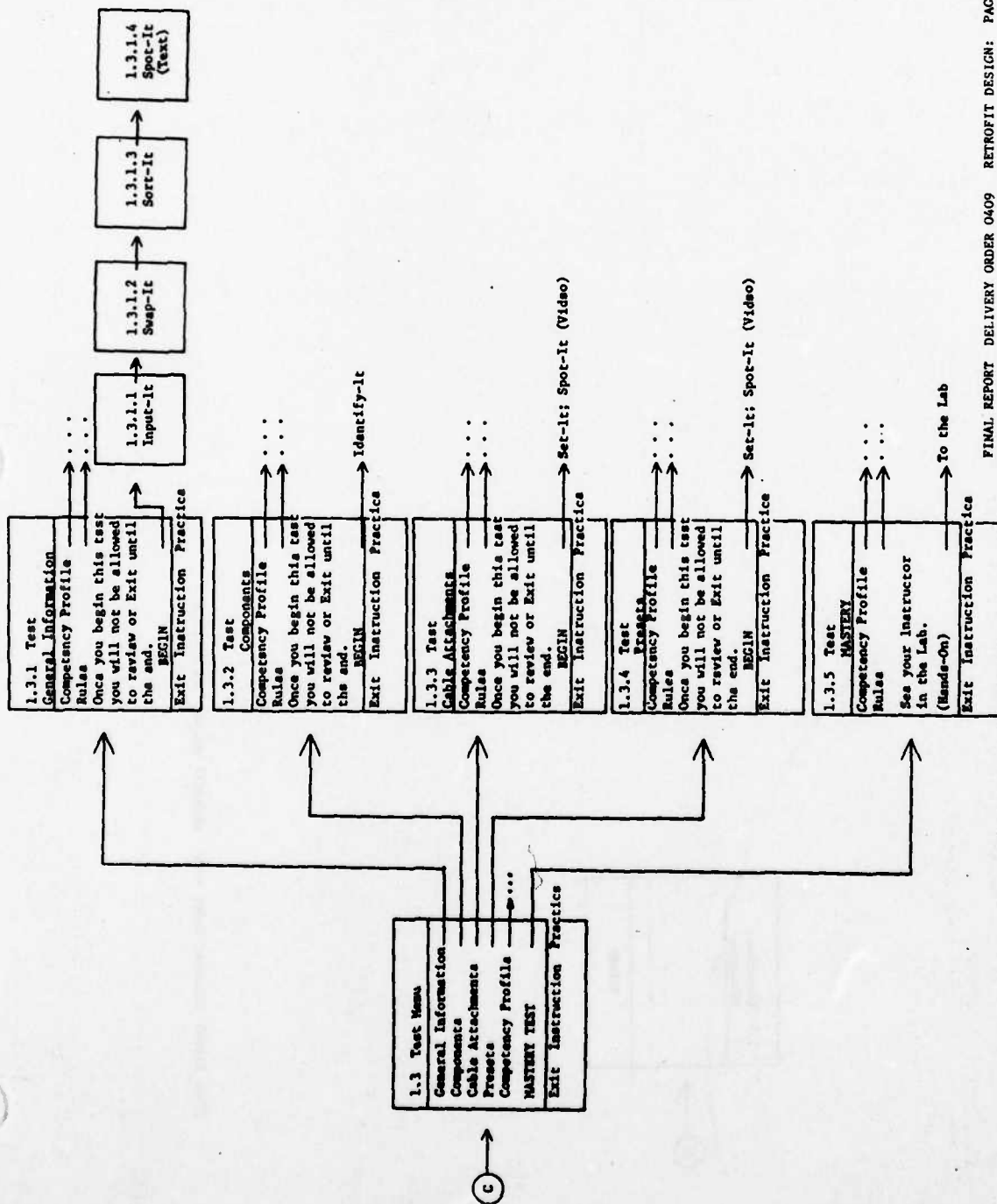
The Test Competencies will show the user's final score after he takes the test(s) that cover the various competencies. These test competencies will indicate to him and/or his instructor when he is ready to take the Mastery (Hands-on) Test.

B. Design I  
Introduction to Radio Set AN/GRC-50  
(Type #201-113-2141)  
2. Overall Architecture









1.4 Competency Histogram		RETURN
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## **2.1 Design I: Interactive Elements: Instructional Section**

- a. View-It**
- b. Explore-It**
- c. See-It**
- d. Explain-It**
- e. References (Reference-It)**

INTERACTIVE ELEMENT: View-It

IRL I

EDUCATIONAL OBJECTIVE:

(Presentational only: Given a menu, the user can select which procedural step, or equipment element he wishes to view.) Therefore, the user can correctly recognize a procedural step, a component part, or a proper instrument reading or setting.

HOW IT WORKS:

The user can elect to view a short video presentation of a component, e.g., Voltage Regulator, from a component menu screen. When the video has ended, the program returns to the component menu screen where the user has Explore-It and Reference options.

USER OPTIONS:

1. Watch the short video presentation.
2. Stop the video during the presentation and return to the component menu screen.
3. After the video presentation -
  - a. Explore the component.
  - b. Access references in his technical manual for that particular component.

INTERACTIVE ELEMENT: Explore-It

IRL III

EDUCATIONAL OBJECTIVE:

(Presentational only: Given a still shot of equipment, the user can touch particular elements and receive a text explanation about a part's name, function, and settings or readings). Therefore, the user can correctly recognize a procedural step, a component part, or a proper instrument reading or setting.

HOW IT WORKS:

The user can choose to explore a component, e.g., transmitter, from a component menu screen. The program will introduce a video pause screen of the component. The user will be able to touch any of the various dials, switches, etc. on the component. When he touches a switch, a text screen will appear that identifies the switch and explains its purpose.

USER OPTIONS:

1. Touch and explore each item as many times as he wishes.
2. After exploring all the parts of the component the user may -
  - a. View a short video presentation of that component.
  - b. Access references in his technical manual for that particular component.

INTERACTIVE ELEMENT: See-It

IRL I

EDUCATIONAL OBJECTIVE:

(Presentational only: Given a group of similar procedures, the user can select which procedure he wishes to view). Therefore, the user can correctly recognize a procedural step, a component part, or a proper instrument reading or setting.

HOW IT WORKS:

The user can select which segment of a procedure, e.g., cable attachments, he wishes to see executed. At the end of the short video segment, the program returns to the procedure menu screen where the user can choose to see another segment.

USER OPTIONS:

1. Select the step in a procedure he wants to see.
2. View each step as many times as he wishes.
3. Stop the short video presentation and return to the procedure menu screen at any time.
4. Access references in his technical manual for the steps of that procedure.

INTERACTIVE ELEMENT: Explain-It IRL I

EDUCATIONAL OBJECTIVE:

(Presentational only: Given a video presentation of a multi-step procedure, the user can interrupt the video at any time to find out the name of a sub-step, replay the video, receive a reference or a text explanation). Therefore, the user can correctly identify procedural sub-steps, and explain the purpose of sub-steps.

HOW IT WORKS:

The user can assess a video explanation outlining the necessary actions for performing the procedures, e.g., component presets.

If the user touches the screen during the video presentation, the program will introduce a text screen that will explain the specific step in the procedure being performed. The user will be able to return to the presentation, replay the entire procedure or access references pertaining to that particular step.

USER OPTIONS:

1. Watch the video explanation of the procedure from start to finish.
2. Stop the video at any point, and:
  - a. Receive a text explanation of the step being performed.
  - b. Return to the video presentation.
  - c. Access references in the technical manual that pertain to that step.
  - d. Replay the entire procedure.
  - e. Exit to the procedure menu screen where the user can access references pertaining to the entire procedure
3. This information may be accessed as many times as it's needed).

INTERACTIVE ELEMENT: References IRL I  
(Reference-It)

EDUCATIONAL OBJECTIVE:

(Presentational only: Given a video sequence or freeze-frame of equipment and/or procedures, the user can receive a reference in manual or other text material to what he is seeing in video). Therefore, the user can correctly find manual passages that explain procedures shown in video.

HOW IT WORKS:

The user can access references in his technical manual from any component menu screen or procedure menu screen. These references pertain to specific components, procedures or steps being addressed at that point in the program. References may be accessed as often as is necessary.

USER OPTIONS:

1. While seeing a presentation the user can receive references in his technical manual, allowing him to:
  - a. Read the material prior to the presentation.
  - b. Follow along in the technical manual while watching the presentation.
  - c. Turn to the technical manual after the presentation.

## **2.2 Design I: Interactive Elements: Practice Section**

**a. Practice Learning Exercises**

**b. Sort-It**

**c. Spot-It (Text)**

**d. Swap-It**

**e. Input-It**

**f. Identify-It**

**g. Spot-It (Video)**

**h. Set-It**

**i. Do-It**

**j. References (Reference-It)**

INTERACTIVE ELEMENT:

Practice Learning  
Exercises composed of  
Sort-It, Spot-It (Text),  
Swap-It, Input-It

IRL II

HOW IT WORKS:

The user will proceed through a series of competency-related factual questions or problems. If the user answers correctly, he will proceed to the next question. If the response is incorrect, he will receive a prompt to help correct his error, and he will be given a second chance. A histogram will record the percentage score for each practice competency. He will be able to access the rules and references for each exercise.

USER OPTIONS:

1. Proceed through the Practice Learning Exercises as often as is necessary.
2. Have two opportunities to answer each problem.
3. Exit to the Practice Menu from any menu.
4. Access the rules for the particular exercise format.
5. Access references in the technical manual pertaining to that exercise's competencies.
6. Check the histogram to see his progress on the practice competencies.
7. Bypass any questions or the entire exercise.



INTERACTIVE ELEMENT: Sort-It

IRL II

EDUCATIONAL OBJECTIVE:

Given up to nine items that are out of sequence, the user will sort them into the correct order.

HOW IT WORKS:

Sort-It will be part of the Practice Learning Exercises. A prompt will appear on the text screen which tells the user to arrange as many as nine steps into the correct order to carry out a procedure. When this task is completed, the user will be told if the steps were sorted correctly. If correct, he is able to proceed to the next exercise. If incorrect, a message shall appear on the screen to help correct the error and he will be given a second chance.

USER OPTIONS:

1. Re-arrange the steps as many times as he wishes before completing the "sort".
2. Access rules which help him perform the Learning Exercise Sort-It.
3. Exit to the practice menu.
4. Access references in the technical manual pertaining to the competencies in this practice learning exercise.
5. Bypass the Sort-It exercise.
6. Access a competencies histogram to review his progress on the practice competencies.

INTERACTIVE ELEMENT:      Spot-It (Text)      IRL II

EDUCATIONAL OBJECTIVE:

Given a problem or question, the user will recognize the appropriate term or response out of a group of possible answers.

HOW IT WORKS:

Spot-It will be part of the Practice Learning Exercise. The user will be prompted to "spot" (highlight) a particular text item on the screen. He will be able to erase his choice. If necessary, when he finishes he will be told whether he 'spotted' the appropriate item. If correct he will proceed to the next question. If incorrect, the user will receive a prompt to aid in correcting his mistake. He will try to 'spot' the appropriate item again.

USER OPTIONS:

1. Change the location of his 'spot' by using erase.
2. Access rules that enable him to perform the Learning Exercise Spot-It.
3. Exit from Spot-It to the Practice Menu.
4. Access references in the technical manual which pertain to competencies of this practice Learning Exercise.
5. Bypass the Spot-It problem or the entire exercise.
6. Access a competencies histogram to review his progress on the practice competencies.

INTERACTIVE ELEMENT: Swap-It

IRL II

EDUCATIONAL OBJECTIVE:

Given a problem or question, the user will recognize the incorrect term or graphic image and replace it with the correct one out of a group of possible answers.

HOW IT WORKS:

Swap-It is part of the Practice Learning Exercises. The user is prompted to 'spot' an item of text and 'swap' a correct term for that item from an 'Answer Well'. The user may erase his choices. He will be informed if he 'spotted' the appropriate item and if he 'swapped' for the right item. If incorrect, he will receive a prompt to help correct the mistake. A second chance will be given to perform this exercise.

USER OPTIONS:

1. Change the location of his 'spot' by using erase.
2. Access rules that enable him to perform the Learning Exercise Swap-It.
3. Exit to Practice Menu.
4. Access references in the technical manual which pertain to competencies of this Practice Learning Exercise.
5. By pass the Swap-It problem or the entire exercise.
6. Access a competencies histogram to review his progress on the practice competencies.

INTERACTIVE ELEMENT:      Input-It

IRL II

EDUCATIONAL OBJECTIVE:

Given a problem or question, the user will input the appropriate term on the keyboard.

HOW IT WORKS:

Input-It will be part of the Practice Learning Exercises. When a prompt appears on the screen, the user should type in the correct answer. If correct, he will proceed to the next question. If incorrect, he will receive a message designed to help him and he will attempt to input again.

USER OPTIONS:

1. Access rules which help him perform the Learning Exercise, Input-It.
2. Exit to the Practice Menu.
3. Access references in the technical manual, which pertain to the competencies in this practice learning exercise.
4. Bypass the Input-It problem or the entire exercise.
5. Access a competencies histogram to review his progress on the practice competencies.

INTEREACTIVE ELEMENT: Identify-It

IRL III

EDUCATIONAL OBJECTIVE:

Given a group of possible answers, the user will be able to touch the switch or dial requested.

HOW IT WORKS:

The user will select a component (e.g., transmitter) from a Practice Components Menu and try to identify the switches, dials, etc. on that component. He will be prompted to 'touch the xxxx switch'. A video pause screen will appear. If the correct part was chosen, the program will continue to the next prompt, 'touch the xxxx dial'. If the incorrect switch was selected, the message, "No, that was the xxxx switch, try again". will appear on the screen. The user shall continue trying until the correct dial is identified. The program will proceed to the next switch.

USER OPTIONS:

1. Is able to identify all of the switches as often as is necessary.
2. The prompt screens enable the user to:
  - a. Access the rules to perform the exercise Identify-It.
  - b. Exit to the Practice Components Menu.
  - c. Access references in the technical manual corresponding to the component to be identified.
  - d. Access a competencies histogram to review his progress on the practice competencies.

INTERACTIVE ELEMENT:      Spot-It (Video)      IRL I

EDUCATIONAL OBJECTIVE:

Given a video presentation (No audio) of a procedure, the user will be able to designate the name of that procedure.

HOW IT WORKS:

The user will be instructed from a Practice Procedures Menu (e.g., presets) to turn the volume all the way down on his system. A prompt will appear, telling the user to try to 'spot' (identify) the procedure he is going to see. A short video segment of a selected procedure will follow, and he will be asked to recognize which one it was. If he is incorrect, he will be prompted to watch the same procedure segment until he gets it correct.

USER OPTIONS:

1. Practice the Spot-It procedures as many times as necessary.
2. The prompt screens enable the user to:
  - a. Access the rules that help him perform the Spot-It video.
  - b. Exit to the Practice Procedures Menu.
  - c. Access references in his technical manual corresponding to the procedures to be identified.
  - d. Access a competencies histogram to review his progress on the practice competencies.

INTERACTIVE ELEMENT: Set-It

IRL IV

EDUCATIONAL OBJECTIVE:

Given an audio prompt, and a video still-frame image, the user can correctly identify a critical equipment component, or instrument setting by touching its image on the screen.

HOW IT WORKS:

The user can try to identify the switches and dials that need to be adjusted and specify where the dial or switch should be set. After a video segment of a procedure has ended, a prompt will appear on the screen, "Locate the xxxx dial". The user will try to touch the correct dial on a video pause screen. If correct he will be asked to designate the correct setting on a text screen. When both these segments are correct the program will proceed to the next step. If incorrect, the user will continue trying to designate the correct dial until he locates it. Two opportunities are given to select the correct setting. An error the first time will cause a message to appear which helps the user select the correct setting.

USER OPTIONS:

1. May try to identify and set switches in the procedure as many times as is necessary.
2. The prompt messages enable the user to:
  - a. Access rules that help him play the Set-It exercise.
  - b. Exit to the Practice Procedure Menu.
  - c. Access references in his technical manual corresponding to the procedures to be carried out.
  - d. Access a competencies histogram to review his progress on the practice competencies.

INTERACTIVE ELEMENT: Do-It

IRL I

EDUCATIONAL OBJECTIVE:

Given a step-by-step video presentation of a procedure, the user will be able to correctly imitate the video and perform that procedure.

HOW IT WORKS:

The user will watch the first step of a procedure being performed. He will try the step on the actual equipment, then he will see the second step and try it, etc.

USER OPTIONS:

1. Watch a step and then try it on the actual equipment.
2. Stop the video and replay it as many times as necessary.
3. Exit after any step.
4. Access references in his technical manual relating to the step and procedure being performed.



INTERACTIVE ELEMENT:

References  
(Reference-It)

IRL I

EDUCATIONAL OBJECTIVE:

(Presentational only: Given a video sequence or freeze-frame of equipment and/or procedures, the user can receive a reference in manual or other text material to what he is seeing in video). Therefore, the user can correctly find manual passages that explain procedures shown in video.

HOW IT WORKS:

From any Practice: Components or Procedures Menu, the user can access references in his technical manual that correspond to the specific components or procedures being addressed in that practice exercise.

USER OPTIONS:

1. While applying his knowledge in a practice exercise, the user can receive references in his technical manual so he can -
  - a. Read the material before he tries it.
  - b. Refer to the manual while he tries it.
  - c. Read the material if he has difficulty performing a task.
2. References may be accessed as often as necessary.

### 2.3 Design I: Interactive Elements: Test Section

- a. General Information Test
- b. Input-It
- c. Spot-It (Text)
- d. Swap-It
- e. Sort-It
- f. Identify-It
- g. Set-It
- h. Spot-It (Video)

INTERACTIVE ELEMENT: General Information: IRL II  
Test

## HOW IT WORKS:

The user will proceed through a series of competency-related factual problems or questions. He will have one opportunity to answer each question. He will not receive any hints. He will be able to access the rules for each exercise. The percentage score for each TEST: competency will be kept in a histogram.

USER OPTIONS:

1. Once he begins this test, the user will not be allowed to exit until all the exercises are completed.
2. There will be one opportunity to answer each question.
3. The rules for the particular formats can be accessed by the user.
4. He can bypass any question or exercise, but he will not be allowed to return to it.
5. After he completes the test he can check the histogram to see how well he scored on the TEST: competencies.

INTERACTIVE ELEMENT: Input-It

IRL II

EDUCATIONAL OBJECTIVE:

Given a problem or question, the user will input the appropriate term on the keyboard.

HOW IT WORKS:

Input-It will be part of the General Information Test. On a text screen, the user is prompted to input a correct answer using the keyboard. He will have one opportunity per question.

USER OPTIONS:

1. The user can erase if he wishes to change the text he has inputted.
2. He can access rules that help him perform the format (Input-It).
3. He can bypass the problem or the entire exercise, but he will not be allowed to return to it.

INTERACTIVE ELEMENT: Spot-It (Text) IRL II

EDUCATIONAL OBJECTIVE:

Given a problem or question, the user will recognize the appropriate term or response out of a group of possible answers.

HOW IT WORKS:

Spot-It will be part of the General Information Test. On a text screen, the user is prompted to "spot", highlight, a particular text item on the screen. He will have one opportunity per question.

USER OPTIONS:

1. Erase if he wishes to change the location of his "spot".
2. Access rules that help him perform the format (Spot-It, text).
3. Bypass the problem or the entire exercise, but he will not be allowed to return to it.

INTERACTIVE ELEMENT:      Swap-It

IRL II

EDUCATIONAL OBJECTIVE:

Given a problem or question, the user will recognize the incorrect term or graphic image and replace it with the correct one out of a group of possible answers.

HOW IT WORKS:

Swap-It will be part of the General Information Test. In addition to "spotting" an item of text on a text screen, the user is prompted to "swap" a correct term for that item from an "Answer Well". He will have one opportunity per problem to "spot" and "swap".

USER OPTIONS:

1. Erase if he wishes to change the location of his "spot".
2. Access rules that help him perform the format (Swap-It).
3. Bypass the problem or the entire exercise, but he will not be allowed to return to it.

INTERACTIVE ELEMENT: Sort-It

IRL II

EDUCATIONAL OBJECTIVE:

Given up to nine items that are out of sequence, the user will sort them into the correct order.

HOW IT WORKS:

This element will be part of the General Information Test. On a text screen, the user is prompted to arrange as many as nine steps in to the correct order to carry out a procedure. He will have one opportunity to "sort" the steps into the correct order.

USER OPTIONS:

1. The user can rearrange the steps as many times as he wishes before he indicates he is finished.
2. He can access rules that help him perform the format (Sort-It).
3. He can bypass the exercise, but he will not be allowed to return to it.

INTERACTIVE ELEMENT: Identify-It

IRL III

EDUCATIONAL OBJECTIVE:

Given a group of possible answers, the user will be able to touch the switch or dial requested.

HOW IT WORKS:

From a Components Test Menu, the user will be prompted to "touch the xxxx switch" of a component. A video pause screen will come up. He will have one opportunity to touch the correct switch. Then the next prompt will come up, etc.

USER OPTIONS:

1. From the prompt screens he can access rules that help him perform the format (Identify-It).



INTERACTIVE ELEMENT: Set-It

IRL IV

EDUCATIONAL OBJECTIVE:

Given an audio prompt and a video still-frame image, the user can correctly identify a critical equipment component or instrument setting by touching its image on the screen.

HOW IT WORKS:

From a Procedures Test Menu, the user will be prompted to identify and adjust the switches to carry out a procedure.

After seeing a video segment of a procedure, a prompt will appear: "Locate the xxxx dial". If incorrect he will be told, "No, you should have touched the xxxx dial. Select the correct setting". If he was correct in locating the dial he will be prompted "Select the correct setting". He will have one opportunity to touch the correct dial and one opportunity to designate the correct setting.

USER OPTIONS:

1. From the prompt screens he can access rules that help him perform the format (Set-It).

INTERACTIVE ELEMENT: Spot-It (Video)

IRL I

EDUCATIONAL OBJECTIVE:

Given a video presentation (No audio) of a procedure, the user will be able to designate the name of that procedure.

HOW IT WORKS:

From a Procedures Test Menu, the user will be prompted to turn the volume all the way down on his system. Then he is prompted to "spot" (identify) the procedure he is going to see. A short video segment of a randomly selected procedure will follow. At the end of the video, a text screen will appear with several possible answers. The user will have one opportunity to answer correctly. Then the next procedure segment will appear, etc.

USER OPTIONS:

1. From the prompt screens the user can access rules that help him perform the format (Spot-It, Video).

2.4 Design I: Interactive Elements: Competency Profile Section  
a. Competency Histogram

INTERACTIVE ELEMENT: Competency Histogram

HOW IT WORKS:

The Competency Histogram shows the user what percentage of the problems or questions associated with the various competencies he has gotten correct. See the list of competencies below.

COMPETENCIES

1. Practice: General Knowledge
2. Practice: Voltage Reg. Components
3. Practice: Receiver Components
4. Practice: Transmitter Components
5. Practice: Power Supply Components
6. Practice: Cable Attachments
7. Practice: Voltage Regulator Presets
8. Practice: Receiver Presets
9. Practice: Transmitter Presets
10. Practice: Power Supply Presets
11. Test: General Knowledge
12. Test: Voltage Regulator Components
13. Test: Receiver Components
14. Test: Transmitter Components
15. Test: Power Supply Components
16. Test: Cable Attachments
17. Test: Voltage Regulator Presets
18. Test: Receiver Presets
19. Test: Transmitter Presets
20. Test: Power Supply Presets

3. Design I: Screens

Tape 2141 (MOS 31M; Operator)

Introduction to Radio Set AN/GRC-50: Cables and Presets

Screen # 1.0  
Screen Title: Course Menu

<u>USER OPTION:</u>	<u>GOES TO:</u>
1. Instruction	1. 1.1 Instruction Menu
2. Practice	2. 1.2 Practice Menu
3. Test	3. 1.3 Test Menu
4. Competency Profile	4. 1.4 Competency Histogram
5. Exit/Log-off	5. Exits from Program

Screen # 1.1  
Screen Title: Instruction Menu

<u>USER OPTION:</u>	<u>GOES TO:</u>
1. General Information	1. 1.1.1 Instruction General Information
2. Components	2. 1.1.2 Instruction Components
3. Cable Attachments	3. 1.1.3 Instruction Cable Attachments
4. Presets	4. 1.1.4 Instruction Presets
5. Competency Profile	5. 1.4 Competency Histogram
6. Exit	6. 1.0 Course Menu
7. Practice	7. 1.2 Practice Menu
8. Test	8. 1.3 Test Menu

Screen # 1.1.1  
Screen Title: Instruction  
General Information

USER OPTION:

GOES TO:

- |                      |   |
|----------------------|---|
| 1. Video Information | 1. Background video info.                                       |
| 2. Text Information  | 2. Background information<br>presented via text screens.        |
| 3. References        | 3. Text screen with page<br>numbers in the Technical<br>Manual. |
| 4. Exit              | 4. 1.1 Instruction Menu   |
| 5. Practice          | 5. 1.2.1 Practice<br>Learning Exercises                         |
| 6. Test              | 6. 1.3.1 Test<br>General Information                            |



Screen # 1.1.2  
Screen Title: Instruction  
Components

<u>USER OPTION:</u>	<u>GOES TO:</u>
1. Voltage Regulator	1.-1.1.2.1 Instruction Voltage Regulator
2. Receiver	2.-1.1.2.2 Instruction Receiver
3. Transmitter	3.-1.1.2.3 Instruction Transmitter
4. Power Supply	4.-1.1.2.4 Instruction Power Supply
5. Dummy Load	5.-1.1.2.5 Instruction Dummy Load
6. Exit	6.-1.1 Instruction Menu
7. Practice	7.-1.2.2 Practice Components
8. Test	8.-1.3.2 Test Components

Screen # 1.1.2.1  
Screen Title: Instruction  
Voltage Regulator

USER OPTION:

GOES TO:

- |               |  |
|---------------|--|
| 1. View-It    | 1. Short video of the<br>Voltage Regulator                     |
| 2. Explore-It | 2. Still Screen of the<br>Voltage Regulator                    |
| 3. References | 3. Text Screen with page<br>numbers in the technical<br>manual |
| 4. Exit       | 4. 1.1.2 Instruction<br>Components                             |
| 5. Practice   | 5. 1.2.2 Practice<br>Components                                |
| 6. Test       | 6. 1.3.2 Test<br>Components                                    |

Screen # 1.1.3

Screen Title: Instruction  
Cable Attachments

USER OPTION:

GOES TO:

- |               |   |
|---------------|---|
| 1. Explain-It | 1. Video of all the cables<br>with replay and references    |
| 2. See-It     | 2. 1.1.3.1 Instruction<br>Cable Attachments: See-It         |
| 3. References | 3. Text Screen with page numbers<br>in the Technical Manual |
| 4. Exit       | 4. 1.1 Instruction Menu                                     |
| 5. Practice   | 5. 1.2.3 Practice<br>Cable Attachments                      |
| 6. Test       | 6. 1.3.3 Test<br>Cable Attachments                          |

Screen # 1.1.3.1

Screen Title: Instruction

Cable Attachments: See-It

USER OPTION:

GOES TO:

1. Cables 1 & 2	1. See-It (Cables 1 & 2)
2. Cable 3	2. See-It (Cable 3)
3. Cable 4	3. See-It (Cable 4)
4. Cable 5	4. See-It (Cable 5)
5. Cable 6	5. See-It (Cable 6)
6. Cable 7	6. See-It (Cable 7)
7. Cable 8	7. See-It (Cable 8)
8. Exit	8.- 1.1.3 Instruction Cable Attachments
9. Practice	9.- 1.2.3 Practice Cable Attachments
10. Test	10.- 1.3.3 Test Cable Attachments

Screen # 1.1.4  
Screen Title: Instruction  
Presets

<u>USER OPTION:</u>	<u>GOES TO:</u>
1. Voltage Regulator	1. Explain-It (Video) of Voltage Regulator Presets with replay and references.
2. Receiver	2. Explain-It (Video) of Receiver Presets
3. Transmitter	3. Explain-It (Video) of Transmitter Presets
4. Power Supply	4. Explain-It (Video) of Power Supply Presets
5. References	5. Text Screen with page numbers in the Technical Manual
6. Exit	6. 1.1 Instruction Menu
7. Practice	7. 1.2.4 Practice Presets
8. Test	8. 1.3.4 Test Presets

Screen #: 1.2  
Screen Title: Practice Menu

<u>USER OPTION:</u>	<u>GOES TO:</u>
1. General Information	1.-1.2.1 Practice General Information
2. Components	2.-1.2.2 Practice Components
3. Cable Attachments	3.-1.2.3 Practice Cable Attachments
4. Presets	4.-1.2.4 Practice Presets
5. Entire Process	5.-1.2.5 Practice Entire Process
6. Competency Profile	6.-1.4 Competency Histogram
7. Exit	7.-1.0 Course Menu
8. Instruction	8.-1.1 Instruction Menu
9. Test	9.-1.3 Test Menu

Screen # 1.2.1  
Screen Title: Practice  
General Information

<u>USER OPTION:</u>	<u>GOES TO:</u>
1. Learning Exercises	1. 1.2.1.1 Sort-It; 1.2.1.2 Spot-It (Text); 1.2.1.3 Input-It; 1.2.1.4 Swap-It.
2. Tutor	2. 1.2.1.5 Practice Tutor
3. Competency Profile	3. 1.4 Competency Histogram
4. Exit	4. 1.2 Practice Menu
5. Instruction	5. 1.1.1 Instruction General Information
6. Test	6. 1.3.1 Test General Information

Screen # 1.2.1.1; 1.2.1.2; 1.2.1.3; 1.2.1.4  
Screen Title: Practice  
Sort-It; Spot-It; Input-It; Swap-It

USER OPTION:

GOES TO:

- |          |  |
|----------|--|
| 1. Exit  | 1. - 1.2.1 Practice<br>General Information |
| 2. Erase | 2. - Erases user input                     |
| 3. Tutor | 3. - 1.2.1.5 Practice<br>Tutor             |
| 4. Next  | 4. - Next question or problem              |



Screen # 1.2.1.5  
Screen Title: Practice  
Tutor

USER OPTION:

GOES TO:

- |                       |  |
|-----------------------|--|
| 1. Rules              | 1. Text Screen with rules for the format                 |
| 2. References         | 2. Text Screen with page numbers in the Technical Manual |
| 3. Competency Profile | 3. 1.4 Competency Histogram                              |
| 4. Return             | 4. Returns to previous screen                            |

Screen # 1.2.2  
Screen Title: Practice  
Components

<u>USER OPTION:</u>	<u>GOES TO:</u>
1. Voltage Regulator	1. Identify-It (Still Screen): Voltage Regulator
2. Receiver	2. Identify-It (Still Screen): Receiver
3. Transmitter	3. Identify-It (Still Screen): Transmitter
4. Power Supply	4. Identify-It (Still Screen): Power Supply
5. References	5. Text Screen with page numbers in the Technical Manual
6. Competency Profile	6. 1.4 Competency Histogram
7. Exit	7. 1.2 Practice Menu
8. Instruction	8. 1.1.2 Instruction Components
9. Test	9. 1.3.2 Test Components

Screen # 1.2.3  
Screen Title: Practice  
Cable Attachments

<u>USER OPTION:</u>	<u>GOES TO:</u>
1. Recognize Cable Attachment Procedures	1. Spot-It (Video) of the 8 Cable Attachment Procedures
2. Attach a Cable	2. 1.2.3.2 Practice Cable Attachments: Set-It
3. Attach all Cables	3. Set-It (flows through all 8 Cables)
4. References	4. Text Screen with page numbers in the Technical Manual
5. Competency Profile	5. 1.4 Competency Histogram
6. Exit	6. 1.2 Practice Menu
7. Instruction	7. 1.1.3 Instruction Cable Attachments
8. Test	8. 1.3.3 Test Cable Attachments

Screen # 1.2.3.1  
Screen Title: Practice  
Cable Attachments: Set-It

<u>USER OPTION:</u>	<u>GOES TO:</u>
1. Cables 1 & 2	1. Set-It (Cables 1 & 2)
2. Cable 3	2. Set-It (Cable 3)
3. Cable 4	3. Set-It (Cable 4)
4. Cable 5	4. Set-It (Cable 5)
5. Cable 6	5. Set-It (Cable 6)
6. Cable 7	6. Set-It (Cable 7)
7. Cable 8	7. Set-It (Cable 8)
8. Exit	8. 1.2.3 Practice Cable Attachments
9. Instruction	9. 1.1.3 Instruction Cable Attachments
10. Test	10. 1.3.3 Test Cable Attachments

Screen # 1.2.4  
Screen Title: Practice  
Presets

USER OPTION:

GOES TO:

- |  |  |
|--|--|
| 1. Recognize Component Preset Procedures | 1. Spot-It (Video) of the 4 Preset Procedures            |
| 2. Preset a Component                    | 2. 1.2.4.1 Practice Presets: Set-It                      |
| 3. Preset all Components                 | 3. Set-It (flows through all 4 Preset Procedures)        |
| 4. References                            | 4. Text Screen with page numbers in the Technical Manual |
| 5. Competency Profile                    | 5. 1.4 Competency Histogram                              |
| 6. Exit                                  | 6. 1.2 Practice Menu                                     |
| 7. Instruction                           | 7. 1.1.4 Instruction Presets                             |
| 8. Test                                  | 8. 1.3.4 Test Presets                                    |

Screen # 1.2.4.1  
Screen Title: Practice  
Presets: Set-It

<u>USER OPTION:</u>	<u>GOES TO:</u>
1. Voltage Regulator	1. Set-It (Voltage Regulator)
2. Receiver	2. Set-It (Receiver)
3. Transmitter	3. Set-It (Transmitter)
4. Power Supply	4. Set-It (Power Supply)
5. References	5. Text Screen with page numbers in the Technical Manual
6. Exit	6. 1.2 Practice Menu
7. Instruction	7. 1.1.4 Instruction Presets
8. Test	8. 1.3.4 Test Presets

UNCLASSIFIED

A FEASIBILITY STUDY AND PLAN: CONVERTING PASSIVE TO  
INTERACTIVE VIDEO(U) BATTELLE MEMORIAL INST COLUMBUS  
OHIO COLUMBUS LABS FEB 83 TDI-TR-83-2 DAAG29-81-D-0100

NL



MICROCOPY RESOLUTION TEST CHART  
NATIONAL BUREAU OF STANDARDS-1963-A



Screen # 1.2.5  
Screen Title: Practice  
Entire Process

USER OPTION:

GOES TO:

- |                |  |
|----------------|--|
| 1. Hands-On    | 1. Do-It (flows through all cable attachment procedures and through all component preset procedures) |
| 2. Exit        | 2. 1.2 Practice Menu   |
| 3. Instruction | 3. 1.1 Instruction Menu  |
| 4. Test        | 4. 1.3.5 Mastery Test  |

Screen # 1.3  
Screen Title: Test Menu

<u>USER OPTION:</u>	<u>GOES TO:</u>
1. General Information	1. 1.3.1 Test General Information
2. Components	2. 1.3.2 Test Components
3. Cable Attachments	3. 1.3.3 Test Cable Attachments
4. Presets	4. 1.3.4 Test Presets
5. Competency Profile	5. 1.4 Competency Histogram
6. Mastery Test	6. 1.3.5 Test Mastery
7. Exit	7. 1.0 Course Menu
8. Instruction	8. 1.1 Instruction Menu
9. Practice	9. 1.2 Practice Menu

Screen # 1.3.1  
Screen Title: Test  
General Information

USER OPTION:

GOES TO:

- |                       |   |
|-----------------------|---|
| 1. Competency Profile | 1. 1.4 Competency Histogram   |
| 2. Rules              | 2. Text Screen with rules<br>for this test.   |
| 3. Begin              | 3. 1.3.1.1 Input-It;<br>1.3.1.2 Swap-It;<br>1.3.1.3 Sort-It;<br>1.3.1.4 Spot-It (Text). |
| 4. Exit               | 4. 1.3 Test Menu  |
| 5. Instruction        | 5. 1.1.1 Instruction<br>General Information   |
| 6. Practice           | 6. 1.2.1 Practice<br>General Information  |

Screen # 1.3.1.1; 1.3.1.2; 1.3.1.3; 1.3.1.4

Screen Title: Test

Input-It; Swap-It; Sort-It; Spot-It (Text)

USER OPTION:

GOES TO:

- |          |  |
|----------|--|
| 1. Erase | 1. Erases User Input                           |
| 2. Rules | 2. Text Screen with rules for the test formats |
| 3. Next  | 3. Next question or problem                    |

Screen # 1.3.2  
Screen Title: Test  
Components

<u>USER OPTION:</u>	<u>GOES TO:</u>
1. Competency Profile	1. 1.4 Competency Histogram
2. Rules	2. Text Screen with rules for this test
3. Begin	3. Identify-It (Voltage Regulator); Identify-It (Receiver); Identify-It (Transmitter); Identify-It (Power Supply).
4. Exit	4. 1.3 Test Menu
5. Instruction	5. 1.1.2 Instruction Components
6. Practice	6. 1.2.2 Practice Components

Screen # 1.3.3  
Screen Title: Test  
Cable Attachments

<u>USER OPTION:</u>	<u>GOES TO:</u>
1. Competency Profile	1. 1.4 Competency Histogram
2. Rules	2. Text Screen with rules for this test.
3. Begin	3. Set-It (Cables 1-8); Spot-It (Video) Cables 1-8
4. Exit	4. 1.3 Test Menu
5. Instruction	5. 1.1.3 Instruction Cable Attachments
6. Practice	6. 1.2.3 Practice Cable Attachments

Screen # 1.3.4  
Screen Title: Test  
Presets

<u>USER OPTION:</u>	<u>GOES TO:</u>
1. Competency Profile	1. 1.4 Competency Histogram
2. Rules	2. Text Screen with rules for this test
3. Begin	3. Set-It (Voltage Regulator); Set-It (Receiver); Set-It (Transmitter); Set-It (Power supply); Spot-It (Video) Preset Procedures 1-4
4. Exit	4. 1.3 Test Menu
5. Instruction	5. 1.1.4 Instruction Presets
6. Practice	6. 1.2.4 Practice Presets

Screen # 1.3.5  
Screen Title: Test  
Mastery

<u>USER OPTION:</u>	<u>GOES TO:</u>
1. Competency Profile	1. 1.4 Competency Histogram
2. Rules	2. Text Screen with rules for this test
3. Hands-On	3. Go to Lab
4. Exit	4. 1.3 Test Menu
5. Instruction	5. 1.1 Instruction Menu
6. Practice	6. 1.2.5 Practice Entire Process



Screen # 1.4

Screen Title: Competency Histogram

USER OPTION:

GOES TO:

1. Return

1. Returns to Previous Screen

C. Design II: Tape 2492, MOS 31E; Maintenance

1. Overall Design

a. Review Section (Optional)

The Review Section allows the user to determine if he has the necessary background for the module. He can access a list of the course prerequisites, and he can practice identifying the component's dials and switches that he will need to know in order to successfully complete this module.

b. Preliminary Assessment (Optional Section)

In the Preliminary Assessment, the user's knowledge of the course material is assessed before he receives any instructional presentation. He must determine which procedure he sees performed after viewing a short segment of it. Once he has seen a segment of a procedure, he will be told to do the next step. He will have to touch the correct switch or dial and set it correctly. The user must answer questions that pertain to information that will be presented in the course.

He will have one opportunity to answer a question or complete an exercise. If he exits before completing the Preliminary Assessment he will not be allowed to return to this section of the program.

Finally, for each competency in the Preliminary Assessment, the user's results will be kept in a histogram. If he passes all of the competencies he can bypass the course presentation and go to his instructor for a Mastery Test (Hands-on). If he does not pass all of the competencies he will be told which ones he passed and which ones he didn't pass. After completing the Preliminary Assessment he will know the materials and procedures which need his concentration.

c. Instructional Section

In the Instructional Section, the user receives course material via video and text. This system enables the user to access specific video segments of interest and to replay these segments. Throughout this section, the user is able to reference page numbers in his technical manual that correspond to the topics being presented.

d. Practice Section

The Practice Section gives the user the opportunity to apply the knowledge he has gained from the Instructional Section. He can try to determine which procedure he is seeing performed after viewing a segment of it. The user may select a procedure that he wants to attempt to do. He will

view a portion of it, then he will be told what step must follow. He will strive to touch the appropriate switch and to specify the correct setting.

In addition, the user shall have the opportunity to answer comprehension questions based on the important facts in the module. If he makes an error on any exercise in the Practice Section, instructional messages will appear on the screen to aid him in correcting his mistakes. He will be able to practice an exercise as many times as he wishes.

From each exercise in the Practice Section, the user can obtain reference page numbers in his Technical Manual corresponding to the task, procedure or information he is trying to apply. While practicing, he will be able to periodically check a histogram to see how well he is performing the various competencies of the module. After he has a good understanding of the components and procedures he can practice all of the tasks on the actual equipment while being guided with step-by-step video examples.

#### e. Test Section

In the Test Section, the user is tested on the general information, and procedures that were presented and practiced in the course. He has to specify which procedure was performed after viewing a short portion of it. Once he has seen a segment of a procedure, he will be told to do the next step. He will have to touch the correct dial or switch and set it correctly. The user must answer comprehension questions that pertain to the facts of the course. He will have one opportunity to take each test. Once he begins a test, he can not exit until he is finished.

Finally, for each competency, the user's results will be kept in a histogram. When he passes all of the competencies he will go to his instructor for a Mastery Test (Hands-on). If he does not complete the Mastery Test satisfactorily, he should review specific material that he failed.

#### f. Competency Profile Section

In the Competency Profile Section, the user will check to see how well he performed the course competencies. The four groups of competencies include: Review, Preliminary Assessment, Practice and Test.

The Review Competency (Optional Section) will indicate to the user how well he knows the information required to begin this course.

The group of Preliminary Assessment Competencies (Optional Section) will indicate the user's strong and weak areas

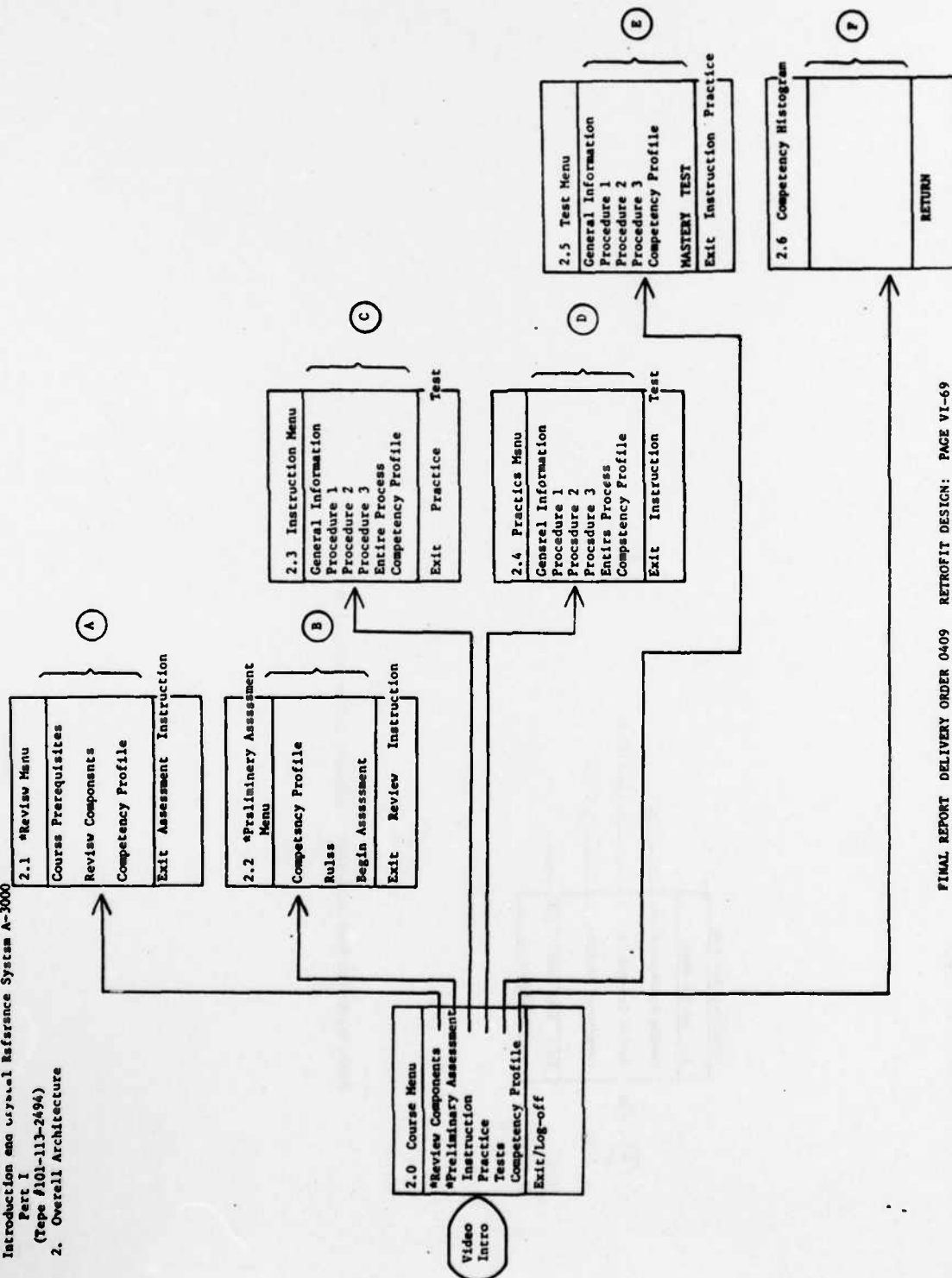
prior to starting the course. These competencies will help to determine the areas which need improvement. If he scores above passing on all competencies, he will be directed to see his instructor to take the Mastery (Hands-on) Test.

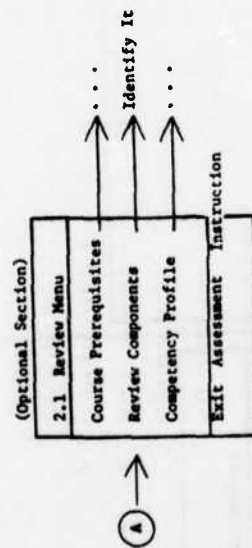
The group of Practice Competencies will reflect the user's progress as he attempts to apply the information that he is learning. He will be able to see which competencies he is good at and which ones necessitate further concentration.

The group of Test Competencies will show the user's final score after he takes the test(s) that cover the various competencies. These Test Competencies will indicate to him and/or his instructor when he is ready to take the Mastery (Hands-on) Test.

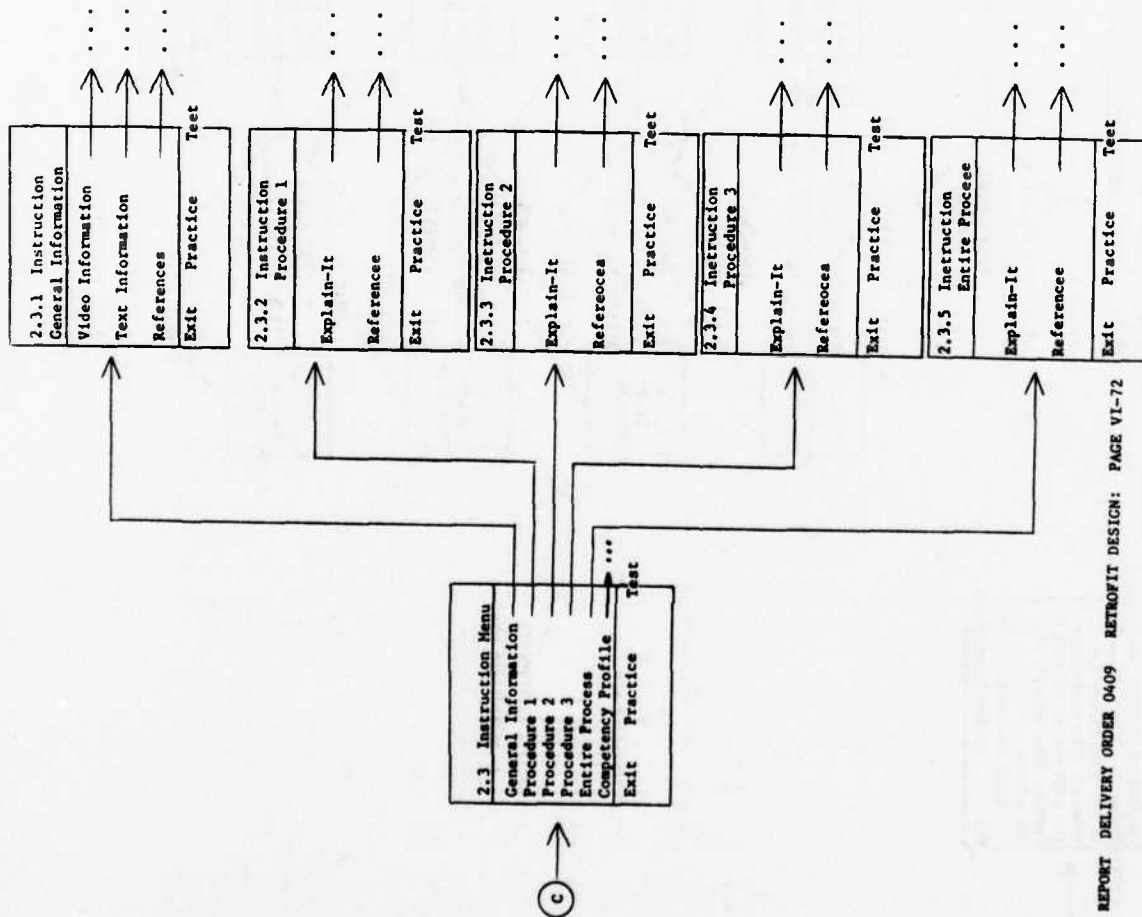
C. Design II  
Introduction and Overall Reference System A-3000

Part I  
(Type #101-113-2494)  
2. Overall Architecture

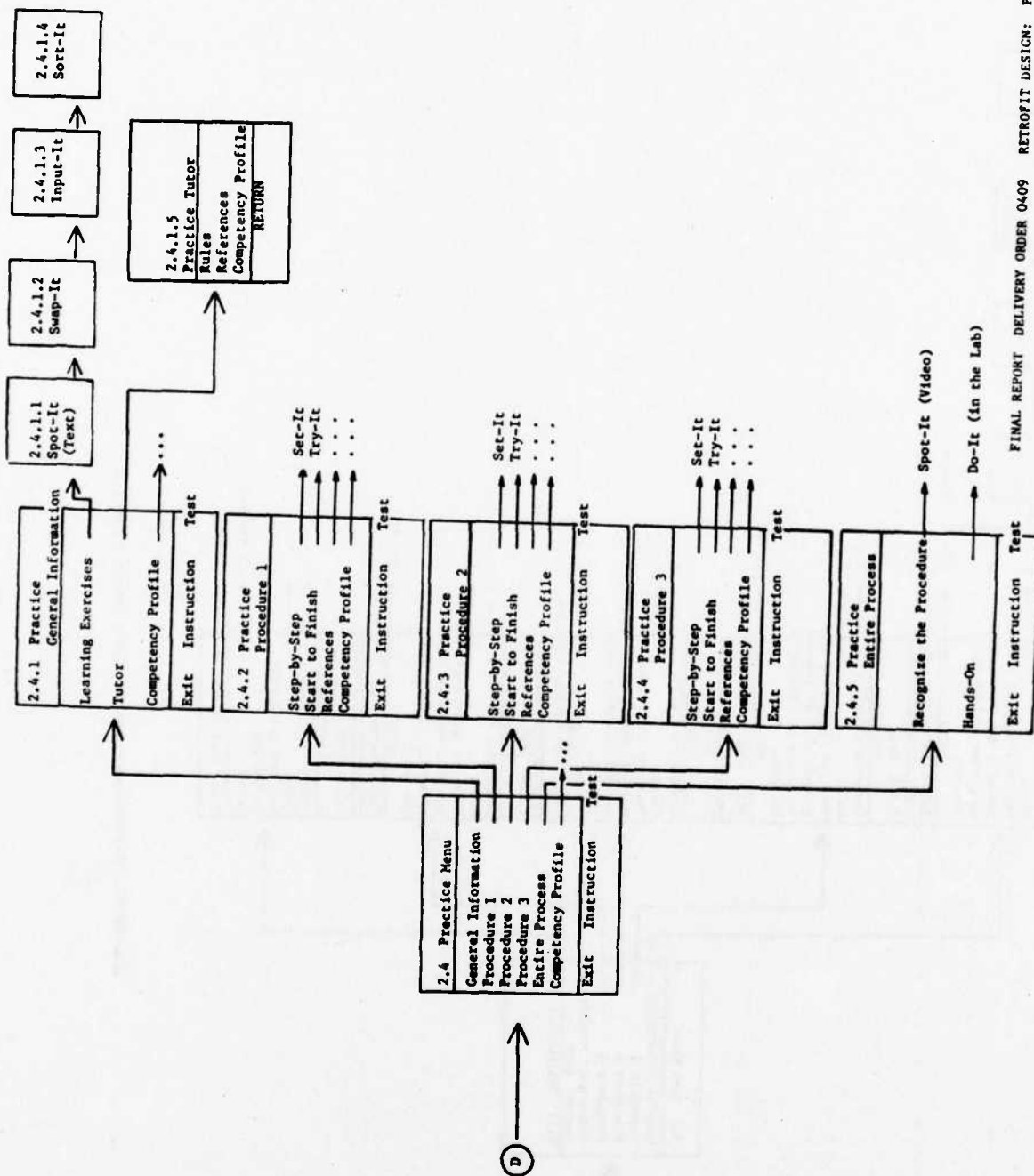


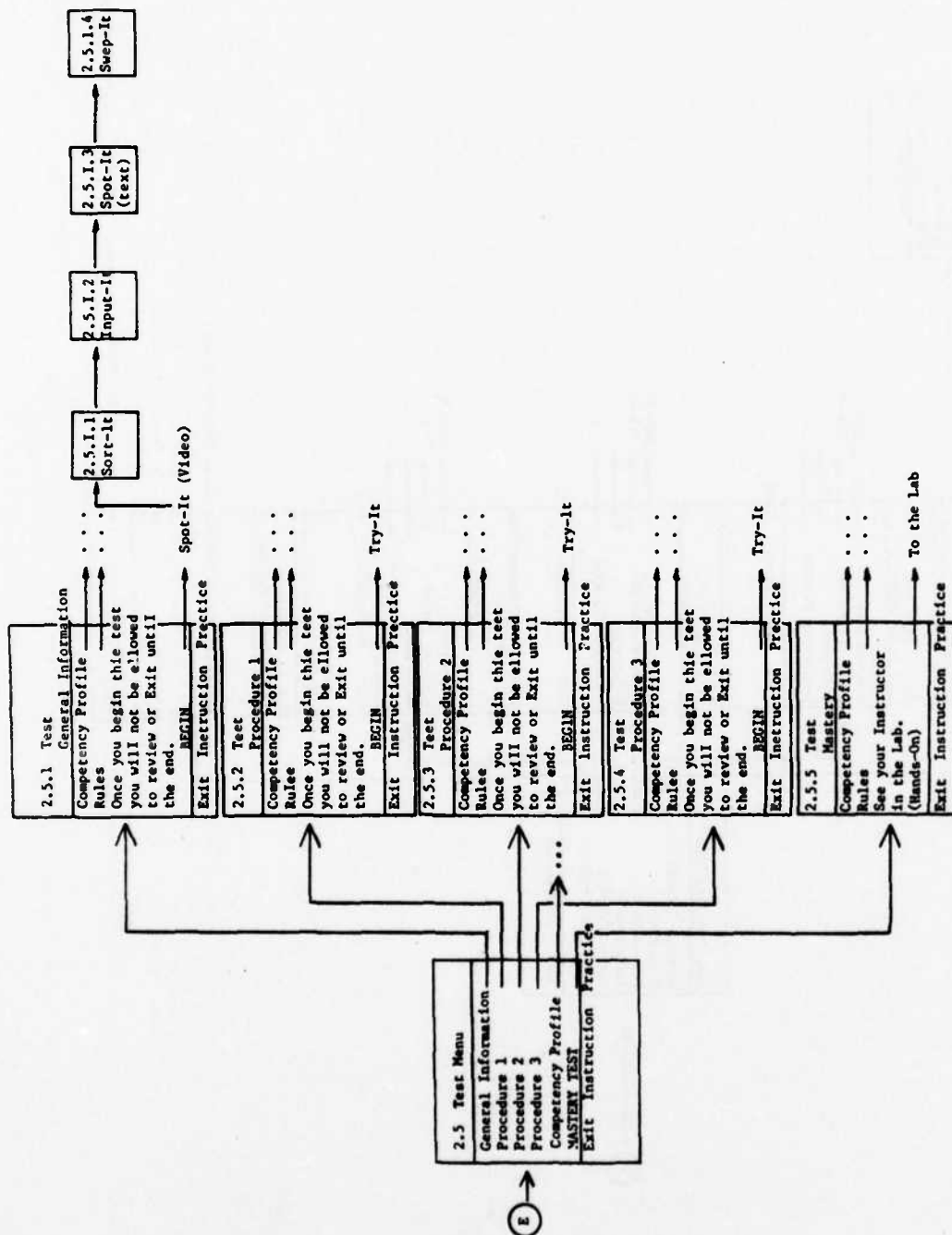












2.6 Competency Histogram
RETURN



2.1 Design II: Interactive Elements: Review Section

a. Identify-It

b. References (Reference-It)

INTERACTIVE ELEMENT:

Identify-It

IRL III

EDUCATIONAL OBJECTIVE:

Given a group of possible answers, the user will be able to touch the switch or dial requested.

HOW IT WORKS:

The user will be shown a component (still screen). He will be asked to identify the switches, dials, etc. on that component. He will be prompted to "Touch the xxx switch." If the correct switch is chosen, the program will continue to the next prompt: "Touch the xxxx dial". If the incorrect switch was selected, the message, "No, that was the xxxx switch, try again" will appear on the screen. The user shall continue trying until the correct switch is identified. Then the program will proceed to the next dial.

USER OPTIONS:

1. Rules can be accessed from the prompt screens to help the user perform (Identify-It).

INTERACTIVE ELEMENT:      References                      IRL I  
   (Reference-It)

EDUCATIONAL OBJECTIVE:

(Presentational only: Given a video sequence or freeze-frame of equipment and/or procedures, the user can receive a reference in manual or other text material to what he is seeing in video). Therefore, the user can correctly find manual passages that explain procedures shown in video.

## HOW IT WORKS:

From the Review Menu, the user can access references to the course prerequisites.

USER OPTIONS:

## 2.2 Design II: Interactive Elements: Preliminary Assessment

- a. Spot-It (Video)
- b. Try-It
- c. Sort-It
- d. Input-It
- e. Spot-It (Text)
- f. Swap-It

INTERACTIVE ELEMENT:      Spot-It (Video)      IRL I

EDUCATIONAL OBJECTIVE:

Given a video presentation (No audio) of a procedure, the user will be able to designate the name of that procedure.

HOW IT WORKS:

In the Preliminary Assessment, the user will be prompted to turn the volume all the way down on his system. Then he will be prompted to "spot" (identify) the procedure he is going to see. A short video segment of a randomly selected procedure will follow. At the end of the video, a text screen will appear with several possible answers. The user will have one opportunity to answer correctly. Then the next procedure segment will appear, etc.

USER OPTIONS:

1. The user can access rules from the prompt screens that help him perform (Spot-It, Video).



INTERACTIVE ELEMENT:

Try-It

IRL IV

EDUCATIONAL OBJECTIVE:

Given audio and visual display of a step in a procedure, the user can identify the equipment component (and/or instrument setting) required in the next procedural step by touching the component's image on the screen.

HOW IT WORKS:

The user will be asked to identify and adjust switches or dials in the proper order to carry out a procedure. After seeing a video segment of a procedure, a prompt will appear: "What is the next step?". If he selects the right step a still screen will appear and he must touch the correct switch. If he touches the right switch he will be prompted "Select the correct setting". If he was incorrect in choosing the right step he will be told "No, the next step is xxxx, touch the xxxx switch on the screen". If he touches the wrong switch, he will be told "No, you should have touched the xxxx switch, select the correct setting." He will have one opportunity to choose the right step, touch the right switch, and designate the correct setting.

USER OPTIONS:

1. From the prompt screens he can access rules that help him perform (Try-It).

INTERACTIVE ELEMENT:      Sort-It              IRL II

EDUCATIONAL OBJECTIVE:

Given up to nine items that are out of sequence, the user will sort them into the correct order.

HOW IT WORKS:

Sort-It will be part of the Preliminary Assessment. On a text screen, the user is prompted to arrange as many as nine steps into the correct order to carry out a procedure. He will have one opportunity to "sort" the steps into the correct sequence.

USER OPTIONS:

1. Rearrange the steps as many times as he wishes before he indicates he is finished.
2. Access rules that help him perform (Sort-It).
3. Bypass the exercise.

INTERACTIVE ELEMENT: Input-It

IRL II

EDUCATIONAL OBJECTIVE:

Given a problem or question, the user will input the appropriate term on the keyboard.

HOW IT WORKS:

Input-It will be part of the Preliminary Assessment. On a text screen, the user is prompted to input a correct answer using the keyboard. He will only have one opportunity per question.

USER OPTIONS:

1. Erase if he wishes to change the text he has inputted.
2. Access rules that help him perform (Input-It).
3. Bypass the problem or the entire exercise.

INTERACTIVE ELEMENT:      Spot-It (Text)      IRL II

EDUCATIONAL OBJECTIVE:

Given a problem or question, the user will recognize the appropriate term or response out of a group of possible answers.

HOW IT WORKS:

Spot-It will be part of the Preliminary Assessment. On a text screen, the user is prompted to "spot", highlight, a particular text item on the screen. He will have one opportunity per question.

USER OPTIONS:

1. Erase if he wishes to change the location of his "spot".
2. Access rules that help him perform (Spot-It, Text).
3. Bypass the problem or the entire exercise.

INTERACTIVE ELEMENT: Swap-It

IRL II

EDUCATIONAL OBJECTIVE:

Given a problem or question, the user will recognize the incorrect term or graphics image and replace it with the correct one out of a group of possible answers.

HOW IT WORKS:

Swap-It will be part of the Preliminary Assessment. In addition to "spotting" an item of text on a text screen, the user is prompted to "swap" a correct term for that item from an "Answer-Well". He will have one opportunity to "spot" and "swap" per problem.

USER OPTIONS:

1. Erase if he wishes to change the location of his "spot".
2. Access rules that help him perform (Swap-It).
3. Bypass the problem or the entire exercise.

### 2.3 DesignII: Interactive Elements: Instructional Section

a. Explain-It

b. References

INTERACTIVE ELEMENT: Explain-It IRL I

EDUCATIONAL OBJECTIVE:

(Presentational only: Given a video presentation of a multi-step procedure, the user can interrupt the video at any time to find out the name of a sub-step, replay the video, receive a reference or text explanation). Therefore, the user can correctly identify procedural sub-steps and explain the purpose of sub-steps.

HOW IT WORKS:

The user can access a video explanation outlining the necessary actions for performing the procedure. If the user touches the screen during the video presentation, the program will introduce a text screen that will explain the specific step in the procedure being performed. The user will be able to return to the presentation, replay the entire procedure or access references pertaining to that particular step.

USER OPTIONS:

1. Watch the video explanation of the procedure from start to finish.
2. Stop the video at any point and:
  - a. Receive a text explanation of the step being performed.
  - b. Return to the video presentation.
  - c. Access references in the technical manual that pertain to that step.
  - d. Replay the entire procedure.
  - e. Exit to the procedure menu screen where the user can access references pertaining to the entire procedure.
3. This information may be accessed as many times as it's needed.

IRL I

(Presentational only: Given a video sequence, or freeze-frame of equipment and/or procedures, the user can receive a reference in manual or other text material to what he is seeing in video). Therefore, the user can correctly find manual passages that explain procedures shown in video.

The user can access references in his technical manual from any procedure menu screen. These references pertain to specific procedures or steps being addressed at that point in the program. References may be accessed as often as necessary.

While seeing a presentation the user can receive references in his technical manual, allowing him to:

- a. Read the material prior to the presentation.
- b. Follow along in the technical manual while watching the presentation.
- c. Turn to the technical manual after the presentation.



## 2.4 Design II: Interactive Elements: Practice Section

- a. Practice Learning Exercises
- b. Spot-It (Text)
- c. Swap-It
- d. Input-It
- e. Sort-It
- f. Set-It
- g. Try-It
- h. Spot-It (Video)
- i. Do-It
- j. References (Reference-It)

INTERACTIVE ELEMENT:      Practice Learning      IRL II  
                         Exercises Composed of:  
                         Sort-It, Spot-It (Text),  
                         Swap-It, Input-It

HOW IT WORKS:

The user will proceed through a series of competency-related factual questions or problems. If the user answers correctly, he will proceed to the next question. If the response is incorrect, he will receive a prompt to help correct his error and then he will be given a second chance. His percentage score for each practice competency will be recorded on a histogram. He will be able to access the rules and references for each format.

USER OPTIONS:

1. Go through the Practice Learning Exercises as often as he wishes.
2. Have two opportunities to answer each problem or question.
3. Exit to the Practice Menu from any exercise.
4. Access the rules for the particular format.
5. Access references in the technical manual pertaining to that exercise's competencies.
6. Check the histogram to see his progress on the practice competencies.
7. Bypass any question or the entire exercise.

INTERACTIVE ELEMENT:      Spot-It (Text)      IRL II

EDUCATIONAL OBJECTIVE:

Given a problem or question, the user will recognize the appropriate term or response out of a group of possible answers.

HOW IT WORKS:

Spot-It will be part of the Practice Learning Exercises. The user will be prompted to "spot" (highlight) a particular text item on the screen. He will be able to erase his choice if necessary. When he finishes he will be told whether he 'spotted' the appropriate item. If correct, he will proceed to the next question. If incorrect, the user will receive a prompt to aid in correcting his mistake. He will try to 'spot' the appropriate item again.

USER OPTIONS:

1. Change the location of his 'spot' using the 'erase'.
2. Access rules that enable him to perform the Learning exercise (Spot-It).
3. Exit to the Practice Menu.
4. Access references in his technical manual which pertain to competencies for this practice learning exercise.
5. Bypass the question or the entire exercise.
6. Access a histogram to review his progress on the practice competencies.

INTERACTIVE ELEMENT: Swap-It

IRL II

EDUCATIONAL OBJECTIVE:

Given a problem or question, the user will recognize the incorrect term or graphics image and replace it with the correct one out of a group of possible answers.

HOW IT WORKS:

Swap-It is part of the Practice Learning Exercises. The user is prompted to 'spot' an item of text and to 'swap' a correct term for that item from an "Answer-Well". The user may erase his choice if necessary. He will be informed if he 'spotted' the appropriate item and if he 'swapped' the correct term. If correct, he will go to the next exercise. If incorrect, he will receive a prompt to help correct the mistake, and he will have a second chance to perform this exercise.

USER OPTIONS:

1. Change the location of his 'spot' using the "erase".
2. Access rules that enable him to perform the Learning Exercise (Swap-It).
3. Exit to Practice Menu.
4. Access references in his technical manual which pertain to competencies for this Practice Learning Exercise.
5. Bypass the problem or the entire Swap-It exercise.
6. Access a histogram to review his progress on the practice competencies.

INTERACTIVE ELEMENT: Input-It

IRL III

EDUCATIONAL OBJECTIVE:

Given a problem or question, the user will input the appropriate term on the keyboard.

HOW IT WORKS:

Input-It will be part of the Practice Learning Exercises. When a prompt appears on the screen, the user should type-in the correct answer. If correct, he will proceed to the next question. If incorrect, he will receive a message designed to help him and he will attempt to input again.

USER OPTIONS:

1. Access rules which enable him to perform the Learning Exercise, (Input-It).
2. Exit to the Practice Menu.
3. Access references in the technical manual, which pertain to the competencies in this Practice Learning Exercise.
4. Bypass the problem or the entire Input-It exercise.
5. Access a histogram to review his progress on the practice competencies.

INTERACTIVE ELEMENT:      Sort-It              IRL II

EDUCATIONAL OBJECTIVE:

Given up to nine items that are out of sequence, the user will sort them into the correct order.

HOW IT WORKS:

Sort-It will be part of the Practice Learning Exercises. A prompt will appear on the text screen which tells the user to arrange as many as nine steps into the correct order to carry out a procedure. When this task is completed, the user will be told if the steps were sorted correctly. If correct, he will proceed to the next exercise. If incorrect, a message shall appear on the screen to help correct the error and he will be given a second chance.

USER OPTIONS:

1. Rearrange the steps as many times as he wishes before indicating he has finished this task.
2. Access rules which help him perform the Learning exercise (Sort-It).
3. Exit to the practice menu.
4. Access references in the technical manual pertaining to the competencies in this Practice Learning Exercise.
5. Bypass the Sort-It exercise.
6. Access a histogram to review his progress on the practice competencies.

INTERACTIVE ELEMENT: Set-It

IRL IV

EDUCATIONAL OBJECTIVE:

Given an audio prompt, and a video still-frame image, the user can correctly identify a critical equipment component or instrument setting by touching its image on the screen.

HOW IT WORKS:

The user tries to identify the switches and dials that need to be adjusted and specifies where the dials or switches should be set. When a short video segment of a procedure has finished, a prompt will appear on the screen, "Locate the xxxx dial". The user will try to touch the correct dial on a video pause screen. If correct, he will be asked to designate the correct setting on a text screen. When both of these choices are correct the program will proceed to the next step. If incorrect, the user will continue trying to designate the correct dial until he locates it. Two opportunities are given to select the correct setting. An error the first time will cause a message to appear which helps the user select the correct setting.

USER OPTIONS:

1. Try to identify and set the switches in the procedure as many times as necessary.
2. The prompt screens enable the user to:
  - a. Access rules that help him perform the Set-It exercise.
  - b. Exit to the Practice Procedure Menu.
  - c. Access references in his technical manual corresponding to the procedure he is carrying out.
  - d. Access a histogram to review his progress on the practice competencies.

INTERACTIVE ELEMENT: Try-It

IRL IV

EDUCATIONAL OBJECTIVE:

Given an audio and visual display of a step in a procedure, the user can identify the equipment component (and/or instrument setting) required in the next procedural step by touching the component's image on the screen.

HOW IT WORKS:

The user can try to identify and adjust switches and dials in the proper order to carry out a procedure. After seeing a video segment of a procedure a prompt will appear: "What is the next step?". If the user selects the right step a still screen will appear and he will be told to try to touch the appropriate dial to carry out that step. If he touches the right dial he will be told to select the correct setting. If the user answers any portion of the "Try-It" incorrectly, he will be given a message to help him make the right choice and he will be given an additional try.

USER OPTIONS:

1. Specify the next step, identify the appropriate dial, and designate the proper setting.
2. The prompt screens enable the user to:
  - a. Access the rules for "Try-It".
  - b. Exit to the Practice Procedure Menu.
  - c. Access references in the technical manual corresponding to the procedure that is being tried.
  - d. Access a histogram so he can review his progress on the practice competencies.



INTERACTIVE ELEMENT:      Spot-It (Video)      IRL I

EDUCATIONAL OBJECTIVE:

Given a video presentation (No audio) of a procedure, the user will be able to designate the name of that procedure.

HOW IT WORKS:

The user will be instructed to turn the volume all the way down on his system. A prompt will appear, telling the user to try to 'spot' (recognize) the procedure he is going to see. A short video segment of a randomly selected procedure will follow. He will try to select the correct answer. If he is incorrect, he will be prompted to watch the same procedure segment until he gets it correct.

USER OPTIONS:

1. Practice the "Spot-It" as many times as necessary.
2. The prompt screens enable the user to:
  - a. Access the rules that help him perform the (Spot-It Video) exercise.
  - b. Exit to the Practice Procedures Menu.
  - c. Access references in his technical manual corresponding to the procedures he is trying to recognize.
  - d. Access a histogram to review his progress on the practice competencies.

INTERACTIVE ELEMENT: Do-It

IRL I

EDUCATIONAL OBJECTIVE:

Given a step-by-step video presentation of a procedure, the user will be able to correctly imitate the video and perform that procedure.

HOW IT WORKS:

The user will watch the first step of a procedure being performed from the Practice Entire Process Menu (Hands-On). He will try the procedure on the actual equipment, then he will see the second step and try it, etc.

USER OPTIONS:

1. Watch a step and then try it on the actual equipment.
2. Stop a video step and replay it as many times as is necessary.
3. Exit after any step.
4. Access references in his technical manual relating to the step and procedure he is trying to perform.

INTERACTIVE ELEMENT:      References      IRL I  
   (Reference-It)

EDUCATIONAL OBJECTIVE:

(Presentational only: Given a video sequence, or freeze-frame of equipment and/or procedures, the user can receive a reference in manual or other text material to what he is seeing in video). Therefore, the user can correctly find manual passages that explain procedures shown in video.

HOW IT WORKS:

From any Practice: Procedures Menu, the user can access references in his technical manual that correspond to the specific procedures being addressed in that practice exercise.

USER OPTIONS:

1. While applying his knowledge in a Practice exercise, the user can receive references in his technical manual so he can:

1.1 Read the material before he tries it.

1.2 Refer to the manual while he tries it.

1.3 Read the material if he has difficulty performing a task.

2. References may be accessed as often as necessary.

2.5 Design II: Interactive Elements: Test Section

- a. General Information Test
- b. Spot-It (Video)
- c. Sort-It
- d. Spot-It (Text)
- e. Swap-It
- f. Input-It
- g. Try-It

INTERACTIVE ELEMENT:

General Information Test

IRL II

HOW IT WORKS:

The user will proceed through a series of competency-related factual problems or questions. He will have one opportunity to answer each question, and will not receive any hints. He will be able to access the rules for each exercise. His percentage score for each TEST: competency will be kept in a histogram.

USER OPTIONS:

1. Once he begins the test, the user will not be allowed to exit until all the exercises are completed.
2. There will be one opportunity to answer each question.
3. The rules for the various formats can be accessed by the user.
4. He can bypass any question or exercise, but he will not be allowed to return to it.
5. After he completes the test, he can check the histogram to see how well he scored on the TEST: competencies.

INTERACTIVE ELEMENT:      Spot-It (Video)      IRL I

EDUCATIONAL OBJECTIVE:

Given a video presentation (No audio) of a procedure, the user will be able to designate the name of that procedure.

HOW IT WORKS:

From a Procedures: Test Menu, the user will be prompted to turn the volume all the way down on his system. Then he is prompted to "spot" (identify) the procedure he is going to see. A short video segment of a randomly selected procedure will follow. At the end of the video, a text screen will appear with several possible answers. The user will have one opportunity to answer correctly. Then the next procedure segment will appear, etc.

USER OPTIONS:

1. From the prompt screens the user can access rules that help him perform (Spot-It, video).

INTERACTIVE ELEMENT: Sort-It

IRL II

EDUCATIONAL OBJECTIVE:

Given up to nine items that are out of sequence, the user will sort them into the correct order.

HOW IT WORKS:

Sort-It will be part of the General Information Test. On a text screen, the user is prompted to arrange as many as nine steps into the proper order to carry out a procedure. He will have one opportunity to "sort" the steps into the correct order.

USER OPTIONS:

1. Rearrange the steps as many times as he wishes before he indicates he is finished.
2. Access rules that help him perform (Sort-It).
3. Bypass the exercise.

INTERACTIVE ELEMENT:      Spot-It (Text)      IRL II

EDUCATIONAL OBJECTIVE:

Given a problem or question, the user will recognize the appropriate term or response out of a group of possible answers.

HOW IT WORKS:

Spot-It will be part of the General Information Test. On a text screen, the user is prompted to "spot", highlight, a particular text item on the screen. He will have one opportunity per question.

USER OPTIONS:

1. Erase if he wishes to change the location of his "spot".
2. Access rules that help him perform (Spot-It).
3. Bypass the problem or the entire exercise.



INTERACTIVE ELEMENT: Swap-It

IRL II

EDUCATIONAL OBJECTIVE:

Given a problem or question, the user will recognize the incorrect term or graphics image and replace it with the correct one out of a group of possible answers.

HOW IT WORKS:

Swap-It will be part of the General Information Test. In addition to "spotting" an item of text on a text screen, the user is prompted to "swap" a correct term for that item from an "Answer-Well". He will have one opportunity to "spot" and "swap" per problem.

USER OPTIONS:

1. Erase if he wishes to change the location of his "spot".
2. Access rules that help him play the game (Swap-It).
3. Bypass the problem or the entire exercise.

INTERACTIVE ELEMENT:      Input-It

IRL II

EDUCATIONAL OBJECTIVE:

Given a problem or question, the user will input the appropriate term on the keyboard.

HOW IT WORKS:

Input-It will be part of the General Information Test. On a text screen, the user is prompted to input a correct answer using the keyboard. He will have one opportunity per question.

USER OPTIONS:

1. Erase if he wishes to change the text he has inputted.
2. Access rules that help him play the game (Input-It).
3. Bypass the problem or the entire exercise.

INTERACTIVE ELEMENT:

Try-It

IRL IV

EDUCATIONAL OBJECTIVE:

Given an audio and visual display of a step in a procedure, the user can identify the equipment component (and/or instrument setting) required in the next procedural step by touching the component's image on the screen.

HOW IT WORKS:

The user will be asked to identify and adjust switches or dials in the correct order to carry out a procedure. After seeing a video segment of a procedure, a prompt will appear: "What is the next step?". If he selects the right step a still screen will appear and he must touch the correct switch. If he touches the right switch he will be prompted "Select the correct setting". If he was incorrect in choosing the right step he will be told "No, the next step is xxxx, touch the xxxx switch on the screen". If he touches the wrong switch, he will be told "No, you should have touched the xxxx switch. Select the correct setting". He will have one opportunity to choose the right step, touch the right switch, and designate the correct setting.

USER OPTIONS:

1. From the prompt screens he can access rules that help him play the game (Try-It).

2.6 Design II: Interactive Elements: Competency Profile Section

a. Competency Histogram

INTERACTIVE ELEMENT: Competency Histogram

HOW IT WORKS:

The Competency Histogram shows the user what percentage of the problems or questions associated with the various competencies he has gotten correct. See the list of competencies below.

COMPETENCIES

1. Review: Components
2. Preliminary Assessment: Procedure 1
3. Preliminary Assessment: Procedure 2
4. Preliminary Assessment: Procedure 3
5. Preliminary Assessment: General Information
6. Preliminary Assessment: Comp 2 & Comp 3 & Comp 4  
& Comp 5
7. Practice: Procedure 1
8. Practice: Procedure 2
9. Practice: Procedure 3
10. Practice: General Information
11. TEST: Procedure 1
12. TEST: Procedure 2
13. TEST: Procedure 3
14. TEST: General Information

### 3. Design II: Screens

Screen # 2.0  
Screen Title: Course Menu

<u>USER OPTION:</u>	<u>GOES TO:</u>
1. *Review Components	1.-2.1 Review Menu
2. *Preliminary Assessment	2.-2.2 Preliminary Assessment Menu
3. Instruction	3.-2.3 Instruction Menu
4. Practice	4.-2.4 Practice Menu
5. Tests	5.-2.5 Test Menu
6. Competency Profile	6.-2.6 Competency Histogram
7. Exit/Log-off	7.- Exits from Program

(\* Optional Sections)

Screen # 2.1  
Screen Title: Review Menu  
(Optional Section)

USER OPTION:

GOES TO:

- |                         |   |
|-------------------------|---|
| 1. Course Prerequisites | 1. Text Screen with Course Names and Numbers; Page Numbers in the Technical Manual. |
| 2. Review Components    | 2. Identify-It (Still Screen) Components  |
| 3. Competency Profile   | 3.-2.6 Competency Histogram   |
| 4. Exit                 | 4.-2.0 Course Menu  |
| 5. Assessment           | 5.-2.2 Preliminary Assessment Menu  |
| 6. Instruction          | 6.-2.3 Instruction Menu   |



Screen # 2.2

Screen Title: Preliminary Assessment Menu  
(Optional Section)

USER OPTION:

GOES TO:

- |                       |  |
|-----------------------|--|
| 1. Competency Profile | 1.-2.6 Competency Histogram  |
| 2. Rules              | 2. Text Screen with rules for the Preliminary Assessment Formats   |
| 3. Begin Assessment   | 3. Spot-It (Video);<br>Try-It;<br>2.2.1 Sort-It;<br>2.2.2 Input-It;<br>2.2.3 Spot-It (Text);<br>2.2.4 Swap-It. |
| 4. Exit               | 4.-2.0 Course Menu   |
| 5. Review             | 5.-2.1 Review Menu   |
| 6. Instruction        | 6.-2.3 Instruction Menu  |

Screen # 2.2.1; 2.2.2; 2.2.3; 2.2.4  
Screen Title: Preliminary Assessment  
Sort-It; Input-It; Spot-It (Text); Swap-It

<u>USER OPTION:</u>	<u>GOES TO:</u>
1. Erase	1. Erases User Input
2. Rules	2. Text Screen with rules for the Preliminary Assessment formats
3. Next	3. Next question or problem

When user completes the Preliminary Assessment:

Goes To:  
4.-2.2.5 Check Competency 6

Screen # 2.2.5  
Screen Title: Check  
Competency 6

<u>USER OPTION:</u>	<u>GOES TO:</u>
1. 90	1.-2.2.5.1 Preliminary Assessment Congratulations
2. 90	2.-2.2.6 Check Procedure 1

Screen # 2.2.5.1  
Screen Title: Preliminary Assessment  
Congratulations

<u>USER OPTION:</u>	<u>GOES TO:</u>
1. Mastery Test	1.-2.5.5 Test Mastery
2. Exit	2.-2.0 Course Menu
3. Instruction	3.-2.3 Instruction Menu
4. Practice	4.-2.4 Practice Menu

Screen # 2.2.6  
Screen Title: Check  
Procedure 1

<u>USER OPTION:</u>	<u>GOES TO:</u>
1. 90	1.-2.2.6.1 You Know Procedure 1
2. 90	2.-2.2.6.2 Study Procedure 1

Screen # 2.2.6.1  
Screen Title: You Know Procedure 1

<u>USER OPTION:</u>	<u>GOES TO:</u>
	1.-2.2.7 Check Procedure 2

Screen # 2.2.6.2  
Screen Title: Study Procedure 1

<u>USER OPTION:</u>	<u>GOES TO:</u>
	1.-2.2.7 Check Procedure 2

Screen # 2.2.7  
Screen Title: Check  
Procedure 2

<u>USER</u> <u>OPTION:</u>	<u>GOES</u> <u>TO:</u>
1. 90	1.-2.2.7.1 You Know Procedure 2
2. 90	2.-2.2.7.2 Study Procedure 2

Screen # 2.2.7.1  
Screen Title: You Know Procedure 2

<u>USER</u> <u>OPTION:</u>	<u>GOES</u> <u>TO:</u>
	1.-2.2.8 Check Procedure 3

Screen # 2.2.7.2  
Screen Title: Study Procedure 2

<u>USER</u> <u>OPTION:</u>	<u>GOES</u> <u>TO:</u>
	1.-2.2.8 Check Procedure 3

Screen # 2.2.8  
Screen Title: Check  
Procedure 3

<u>USER OPTION:</u>	<u>GOES TO:</u>
1. 90	1.-2.2.8.1 You Know Procedure 3
2. 90	2.-2.2.8.2 Study Procedure 3

Screen # 2.2.8.1  
Screen Title: You Know Procedure 3

<u>USER OPTION:</u>	<u>GOES TO:</u>
	1.-2.2.9 Check General Information

Screen # 2.2.8.2  
Screen Title: Study Procedure 3

<u>USER OPTION:</u>	<u>GOES TO:</u>
	1.-2.2.9 Check General Information

Screen # 2.2.9  
Screen Title: Check  
General Information

<u>USER OPTION:</u>	<u>GOES TO:</u>
1. 90	1.-2.2.9.1 You Know the General Information
2. 90	2.-2.2.9.2 Study the General Information

Screen # 2.2.9.1  
Screen Title: You Know the General Information

<u>USER OPTION:</u>	<u>GOES TO:</u>
	1.-2.0 Course Menu

Screen # 2.2.9.2  
Screen Title: Study the General Information

<u>USER OPTION:</u>	<u>GOES TO:</u>
	1.-2.0 Course Menu

Screen # 2.3  
Screen Title: Instruction Menu

<u>USER OPTION:</u>	<u>GOES TO:</u>
1. General Information	1.-2.3.1 Instruction General Information
2. Procedure 1	2.-2.3.2 Instruction Procedure 1
3. Procedure 2	3.-2.3.3 Instruction Procedure 2
4. Procedure 3	4.-2.3.4 Instruction Procedure 3
5. Entire Process	5.-2.3.5 Instruction Entire Process
6. Competency Profile	6.-2.6 Competency Histogram
7. Exit	7.-2.0 Course Menu
8. Practice	8.-2.4 Practice Menu
9. Test	9.-2.5 Test Menu

Screen # 2.3.1  
Screen Title: Instruction  
General Information

<u>USER OPTION:</u>	<u>GOES TO:</u>
1. Video Information	1. Background Video Information
2. Text Information	2. Background Information presented in text screens
3. References	3. Text Screen with page numbers in the Technical Manual
4. Exit	4.-2.3 Instruction Menu
5. Practice	5.-2.4.1 Practice General Information
6. Test	6.-2.5.1 Test General Information



Screen # 2.3.2  
Screen Title: Instruction  
Procedure 1

USER OPTION:

GOES TO:

- |               |  |
|---------------|--|
| 1. Explain-It | 1. Video of Procedure 1 with replay and references       |
| 2. References | 2. Text Screen with page numbers in the Technical Manual |
| 3. Exit       | 3.-2.3 Instruction Menu                                  |
| 4. Practice   | 4.-2.4.2 Practice Procedure 1                            |
| 5. Test       | 5.-2.5.2 Test Procedure 1                                |

Screen # 2.3.3  
Screen Title: Instruction  
Procedure 2

USER OPTION:

GOES TO:

- |               |   |
|---------------|---|
| 1. Explain-It | 1. Video of Procedure 2 with<br>replay and references       |
| 2. References | 2. Text Screen with page numbers<br>in the Technical Manual |
| 3. Exit       | 3.-2.3 Instruction Menu                                     |
| 4. Practice   | 4.-2.4.3 Practice<br>Procedure 2                            |
| 5. Test       | 5.-2.5.3 Test<br>Procedure 2                                |

Screen # 2.3.4  
Screen Title: Instruction  
Procedure 3

USER OPTION:

GOES TO:

- |               |  |
|---------------|--|
| 1. Explain-It | 1. Video of Procedure 3 with replay and references       |
| 2. References | 2. Text Screen with page numbers in the Technical Manual |
| 3. Exit       | 3.-2.3 Instruction Menu                                  |
| 4. Practice   | 4.-2.4.4 Practice Procedure 3                            |
| 5. Test       | 5.-2.5.4 Test Procedure 3                                |

Screen # 2.3.5  
Screen Title: Instruction  
Entire Process

USER OPTION:

GOES TO:

- |               |  |
|---------------|--|
| 1. Explain-It | 1. Video of the Entire Process with<br>replay and references |
| 2. References | 2. Text Screen with page numbers in<br>the Technical Manual  |
| 3. Exit       | 3.-2.3 Instruction Menu                                      |
| 4. Practice   | 4.-2.4.5 Practice<br>Entire Process                          |
| 5. Test       | 5.-2.5.5 Test Mastery  |

Screen # 2.4  
Screen Title: Practice Menu

<u>USER OPTION:</u>	<u>GOES TO:</u>
1. General Information	1.-2.4.1 Practice General Information
2. Procedure 1	2.-2.4.2 Practice Procedure 1
3. Procedure 2	3.-2.4.3 Practice Procedure 2
4. Procedure 3	4.-2.4.4 Practice Procedure 3
5. Entire Process	5.-2.4.5 Practice Entire Process
6. Competency Profile	6.-2.6 Competency Histogram
7. Exit	7.-2.0 Course Menu
8. Instruction	8.-2.3 Instruction Menu
9. Test	9.-2.5 Test Menu

Screen # 2.4.1  
Screen Title: Practice  
General Information

USER OPTION:

GOES TO:

1. Learning Exercises	1.-2.4.1.1 Spot-It (Text); 2.4.1.2 Swap-It; 2.4.1.3 Input-It; 2.4.1.4 Sort-It.
2. Tutor	2.-2.4.1.5 Practice Tutor
3. Competency Profile	3.-2.6 Competency Histogram
4. Exit	4.-2.4 Practice Menu
5. Instruction	5.-2.3.1 Instruction General Information
6. Test	6.-2.5.1 Test General Information

Screen # 2.4.1.1; 2.4.1.2; 2.4.1.3; 2.4.1.4  
Screen Title: Practice  
Spot-It (Text); Swap-It; Input-It; Sort-It

USER OPTION:

GOES TO:

- |          |  |
|----------|--|
| 1. Exit  | 1.-2.4.1 Practice<br>General Information |
| 2. Erase | 2. Erases User Input                     |
| 3. Tutor | 3.-2.4.1.5 Practice<br>Tutor             |
| 4. Next  | 4. Next question or format               |

Screen # 2.4.1.5  
Screen Title: Practice  
Tutor

USER OPTION:

GOES TO:

- |                       |  |
|-----------------------|--|
| 1. Rules              | 1. Text Screen with rules for the format                 |
| 2. References         | 2. Text Screen with page numbers in the Technical Manual |
| 3. Competency Profile | 3.-2.6 Competency Histogram                              |
| 4. Return             | 4. Returns to previous Screen                            |



Screen # 2.4.2  
Screen Title: Practice  
Procedure 1

<u>USER OPTION:</u>	<u>GOES TO:</u>
1. Step-by-Step	1. Set-It (Procedure 1)
2. Start to Finish	2. Try-It (Procedure 1)
3. References	3. Text Screen with page numbers in the Technical Manual
4. Competency Profile	4.-2.6 Competency Histogram
5. Exit	5.-2.4 Practice Menu
6. Instruction	6.-2.3.2 Instruction Procedure 1
7. Test	7.-2.5.2 Test Procedure 1

Screen # 2.4.3  
Screen Title: Practice  
Procedure 2

USER OPTION:

GOES TO:

- |                       |   |
|-----------------------|---|
| 1. Step-by-Step       | 1. Set-It (Procedure 2)                                     |
| 2. Start to Finish    | 2. Try-It (Procedure 2)                                     |
| 3. References         | 3. Text Screen with page numbers<br>in the Technical Manual |
| 4. Competency Profile | 4.-2.6 Competency Histogram                                 |
| 5. Exit               | 5.-2.4 Practice Menu  |
| 6. Instruction        | 6.-2.3.3 Instruction<br>Procedure 2                         |
| 7. Test               | 7.-2.5.3 Test<br>Procedure 2                                |

Screen # 2.4.4  
Screen Title: Practice  
Procedure 3

<u>USER OPTION:</u>	<u>GOES TO:</u>
1. Step-by-Step	1. Set-It (Procedure 3)
2. Start to Finish	2. Try-It (Procedure 3)
3. References	3. Text Screen with page numbers in the Technical Manual
4. Competency Profile	4.-2.6 Competency Histogram
5. Exit	5.-2.4 Practice Menu
6. Instruction	6.-2.3.4 Instruction Procedure 3
7. Test	7.-2.5.4 Test Procedure 3

Screen # 2.4.5  
Screen Title: Practice  
Entire Process

USER OPTION:

GOES TO:

- |                            |  |
|----------------------------|--|
| 1. Recognize the Procedure | 1. Spot-It (Video) of the<br>3 Procedures    |
| 2. Hands-On                | 2. Do-It (flows through the<br>3 Procedures) |
| 3. Exit                    | 3.-2.4 Practice Menu                         |
| 4. Instruction             | 4.-2.3.5 Instruction<br>Entire Process       |
| 5. Test                    | 5.-2.5.5 Test Mastery                        |

Screen # 2.5  
Screen Title: Test Menu

<u>USER OPTION:</u>	<u>GOES TO:</u>
1. General Information	1.-2.5.1 Test General Information
2. Procedure 1	2.-2.5.2 Test Procedure 1
3. Procedure 2	3.-2.5.3 Test Procedure 2
4. Procedure 3	4.-2.5.4 Test Procedure 3
5. Competency Profile	5.-2.6 Competency Histogram
6. Mastery Test	6.-2.5.5 Test Mastery
7. Exit	7.-2.0 Course Menu
8. Instruction	8.-2.3 Instruction Menu
9. Practice	9.-2.4 Practice Menu

Screen # 2.5.1  
Screen Title: Test  
General Information

<u>USER OPTION:</u>	<u>GOES TO:</u>
1. Competency Profile	1.-2.6 Competency Histogram
2. Rules	2. Text Screen with rules for this test
3. Begin	3. Spot-It (Video) - Procedures; 2.5.1.1 Sort-It; 2.5.1.2 Input-It; 2.5.1.3 Spot-It; 2.5.1.4 Swap-It.
4. Exit	4.-2.5 Test Menu
5. Instruction	5.-2.3.1 Instruction General Information
6. Practice	6.-2.4.1 Practice General Information

Screen # 2.5.1.1; 2.5.1.2; 2.5.1.3; 2.5.1.4  
Screen Title: Test  
Sort-It; Input-It; Spot-It (Text); Swap-It

USER OPTION:

GOES TO:

- |          |   |
|----------|---|
| 1. Erase | 1. Erases User Input                              |
| 2. Rules | 2. Text Screen with rules for the<br>test formats |
| 3. Next  | 3. Next question or format                        |

Screen # 2.5.2  
Screen Title: Test  
Procedure 1

USER OPTION:

GOES TO:

- |                       |   |
|-----------------------|---|
| 1. Competency Profile | 1.-2.6 Competency Histogram             |
| 2. Rules              | 2. Text Screen with rules for this test |
| 3. Begin              | 3. Try-It (Procedure 1)                 |
| 4. Exit               | 4.-2.5 Test Menu                        |
| 5. Instruction        | 5.-2.3.2 Instruction<br>Procedure 1     |
| 6. Practice           | 6.-2.4.2 Practice<br>Procedure 1        |



Screen # 2.5.3  
Screen Title: Test  
Procedure 2

<u>USER OPTION:</u>	<u>GOES TO:</u>
1. Competency Profile	1.-2.6 Competency Histogram
2. Rules	2. Text Screen with rules for this test
3. Begin	3. Try-It (Procedure 2)
4. Exit	4.-2.5 Test Menu
5. Instruction	5.-2.3.3 Instruction Procedure 2
6. Practice	6.-2.4.3 Practice Procedure 2

Screen # 2.5.4  
Screen Title: Test  
Procedure 3

<u>USER OPTION:</u>	<u>GOES TO:</u>
1. Competency Profile	1.-2.6 Competency Histogram
2. Rules	2. Text Screen with rules for this test
3. Begin	3. Try-It (Procedure 3)
4. Exit	4.-2.5 Test Menu
5. Instruction	5.-2.3.4 Instruction Procedure 3
6. Practice	6.-2.4.4 Practice Procedure 3

Screen # 2.5.5  
Screen Title: Test  
Mastery

<u>USER OPTION:</u>	<u>GOES TO:</u>
1. Competency Profile	1.-2.6 Competency Histogram
2. Rules	2. Text Screen with rules for this test
3. Hands-On	3. Go to Lab
4. Exit	4.-2.5 Test Menu
5. Instruction	5.-2.3.5 Instruction Entire Process
6. Practice	6.-2.4.5 Practice Entire Process

Screen # 2.6  
Screen Title: Competency Histogram

USER OPTION:

GOES TO:

1. Return

1. Returns to Previous Screen

## VII. Discussion

The following section will detail a set of discussion points raised by the current research. Some of these points must be resolved prior to further action, and each decision impacts on downstream efforts.

Issue #1: How do we maximize the educational effectiveness of the interactive courseware based on existing video material?

The issue here is one of extreme importance to the overall success of the mission, and it is directly under the control of the designers and developers.

Our study of the video materials existing in the Ft. Gordon Library showed an expected distribution of video at each of the IRL Levels. Figure 1 shows that distribution.

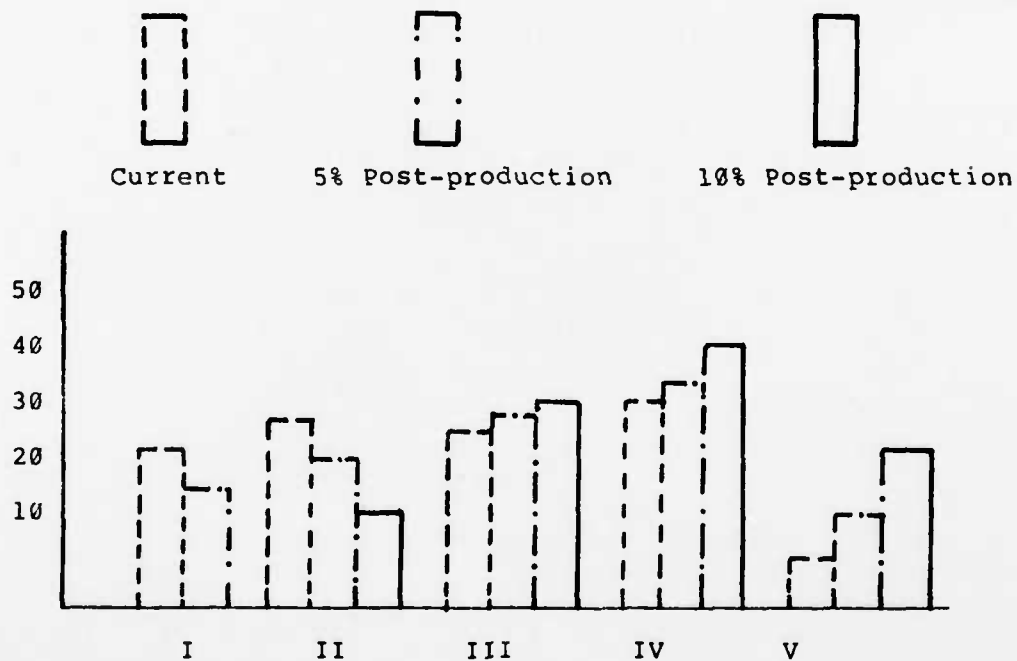


Figure 1

Estimate IRL Ratings With Varying Levels of Post-Production

It is our belief that the educational effectiveness of the materials will be increased to the extent that we can shift

the distribution of the tapes to a higher IRL level as depicted in Figure 1. This figure shows the most pronounced effects of post-production activity would be at Level IV and Level V. This would be a very important improvement since these higher IRL levels provide the opportunity for the most advanced design.

It is important to again put in perspective the kind of post production changes that we would foresee. They would primarily involve the addition or movement of audio and the addition of a small set of still frames to the video. These minor changes would also allow for some updating of the video where appropriate. Since we believe that the product will ultimately work best in a video disc environment, these post production efforts could be done at the point in time when a 1" master is prepared for video disc production.

Issue #2: What is the best video format for ultimate distribution of the video materials?

Using ITS' retrofit methodology it is possible to utilize a wide variety of 1/2" and 3/4" video tape recorders as the video source. The new 1/2" technology, particularly the industrial grade VHS players made by Panasonic are well suited for interactive video.

However, when technical material is presented in an interactive mode the designers who are retrofitting the video often wish to make fairly extensive use of still frames. These still frames are particularly critical at the higher IRL's. While technically possible using a variety of tape players, repeated still framing causes wear to both tape and player. As such, it is our recommendation that tape be used as a development tool and that student systems utilize one of the commonly available laser disc players. Laser disc players have several features which make them particularly well-suited to the task.

- o They have unlimited still frame capability without wear to the disc or player.
- o Duplication of the video material is efficient and extremely low-cost in comparison to tape.
- o Random access improves the user characteristics of the video allowing higher IRL's. Because of the precision of frame identification, narrower original video product constraints can be tolerated in a retrofit.

Converting the existing tapes to laser disc formats is a remarkably easy task. All that would be required is a formatted 1" type C video tape (or 2" tape) which would be shipped to the disc contractor used by the Army. This tape would not require any special data encoding or "significant frames" of any type. This means that no computer code would reside on the disc. All program instruction would be stored magnetically either on floppy disks or on a hard disk drive. This distribution of data reduces the time and cost to master a video disc to a task which can reliably be completed one week for between one and two thousand dollars (not assuming special reduced rates for the U.S. Military).

Once the existing video tape is converted to video disc it will then be in a format that is compatible with the long term dissemination plan now being developed by the Army. Since the laser disc would contain only video images and no programming, any future system would be capable of supporting the video material. Since Interactive Training Systems utilizes the P-Code operating system and UCSD Pascal as the programming language for its courseware development, it can be expected that all courseware developed in support of the video discs would be transportable to the particular configuration finally selected as

a standard by the Army. Thus, the retrofitting effort being proposed could bring into existence the first large-scale library of interactive training material for the standard interactive training configuration selected by the Army.

Issue #3: How can interactive video technology be integrated into the MOS training environment?

This is perhaps the most difficult issue that must be addressed. While an effort to convert the passive video to interactive could easily be launched, such an effort would not be likely to succeed without the proper groundwork. This groundwork is what we call "formative research"; it is that data and information required to insure three things:

- o First, that the design of the educational architecture corresponds to the perceived needs of instructors, designers, and students.
- o Second, that the courseware design is appealing and motivating for the student population.
- o Third, that student comprehension of the educational goals of the material is unambiguous.

Together, these issues point to the need to integrate the new technology into the current learning environment, rather than simply add a new device. The danger here is that we fail to see the new technology as an opportunity to enhance the MOS training, rather than merely make the tape interactive. Without prior retrofit efforts we have taken the opportunity to reconstitute the training effort and thereby significantly increase efficiency, retention, and student motivation.

To do this successfully we recommend a careful study as outlined in Phase II. The study will not be based on a hypothetical system, but on actual prototype interactive retrofit. This prototype system will serve as a springboard for discussion and analysis as outlined below. It will insure that our educational goals are met and that all points of view, including the users, will have been incorporated into the design.



#### VIII. Recommendation for Phase II

Having completed Phase I, Interactive Training Systems believes that consideration should now be given to the development of a prototype system for the purpose of testing the efficiency and power of ITS' retrofitting techniques. This recommendation for action will cover two phases of activity, as well as address a set of technical questions related to library conversion.

##### Phase II - Retrofitting a Selected Set of Tapes

Step 1: The first task will be to confirm the selection of the video tapes for conversion to the interactive technology. The tapes selected should represent both operator and maintenance training, and should vary in skill level. The tapes should also vary in IRL. The Phase I tapes selected for detailed design should be among those chosen.

Step 2: These tapes and all relevant courseware materials should be made available for detailed analysis prior to implementation of the design.

Step 3: The final design should be reviewed by relevant parties representing Ft. Gordon and the program material should then be developed. This process can be completed in a relatively short time span since substantial planning and design effort will have preceded this step.

Once complete, these prototype materials will be used essentially as stimulus material for a process of formative research in which different groups involved with the material will have the opportunity to shape the product from their varying perspectives.

Step 4: Instructors and those responsible for training delivery should be actively involved in the design review of the interactive courseware. They should serve in both a creative process and a review capacity to help shape the way interactive technologies can be used to maximize training effectiveness.

Step 5: A process similar to that described above should be undertaken with those involved in design and development of courseware. They are extremely well versed in the materials and can provide the necessary background for a successful retrofit.

Step 6: Students, the ultimate judges of the success of the effort will be asked to take part in the formative research process to make certain that the final

design captures attention, appeals to the user, and has the capacity to teach effectively.

They will actually use the prototype system and their experience with the system will be analyzed. They will take part in "focus group" activities in which they will critique the system and describe the features they like and dislike.

Step 7: Following a compilation of the data from instructors, course developers, and students, Interactive Training Systems will propose a finalized courseware architecture. This new architecture will incorporate as many of the desired features and eliminate all of the undesirable elements discovered through the formative research process. In effect, it would represent a design handbook for the materials and audience, and would insure the success of a larger scale retrofit effort.

Step 8: Implementation of the new design/architecture is now the task. The materials prepared in Phase II, Step 3 would be reconstituted and reworked to follow the design criteria developed above.

Step 9: These new interactive modules would be evaluated by the instructors and designers who participated above to insure that appropriate action had been taken. Students not previously exposed to the system would then participate in a second round of user research to confirm the courseware design.

Having completed these nine steps the Army would have the necessary data to proceed with confidence on the Library conversion effort. The interactive architecture will have been tested and the product free of all major design defects. Some minor feature changes can be expected, however the utility and efficiency of the overall design will have been assured.

### Phase III - MOS Conversion

The next major phase of activity will involve taking a selected operator MOS and a selected maintenance MOS and treating the full set of video and course material in the retrofit process as finalized in Phase II. This will be a major step toward achieving the library conversion concept as identified at the onset of Phase I.

Phase III will allow us to generate a variety of data relevant to retrofit cost and educational effectiveness. This will be our first opportunity to consider the impact of interactive technology on an entire MOS. There will be a number of steps in the process of retrofitting the MOS material.

While it would be possible to identify the steps in Phase III, there will likely be significant variation introduced

as a result of Phase II activities. Therefore, we will refrain from presenting a detailed plan for Phase III at this point.

#### Estimated Man-day Requirements and Costs of Retrofitting

Using the detailed retrofit design in Section VI as a model, it is possible to estimate the effort required to retrofit a videotape. The estimates which follow are based on the following assumptions.

1. Each videotape is given a 'complete treatment' in retrofit, ie. all possible features at IRL I through IV are added. As in the designs in Section VI, this entails a large number of learning exercises in each of three sections: Instruction, Practice and Testing. Designed in this fashion, each interactive module would incorporate the videotape and supporting materials such that 60-90 minutes of instruction would result.
2. Each videotape would be designed separately. There would not be a standard architecture employed that would be reproducible from module to module in the prototype stage. Such a standard architecture would likely emerge at the transition from prototype to production and would likely reduce the manpower required for each module.
3. There will be no post-production effort on the video materials.
4. All student management and score-tracking features will be invoked.

These assumptions allow us to generate the required cost data. It is very likely that these assumptions will change in a shift from retrofitting single modules to taking larger blocks of material. With the shift from prototype to production will come an expected economy of scale.

Table 1 gives the estimated manpower requirements for a given retrofit of an average Ft. Gordon tape of the type detailed in Section VI. Manpower is broken into three broad classifications: Level A (principally Design professionals), Level B (primarily writing/editing professionals), and Level C (primarily data entry and miscellaneous). Tasks are collapsed into three broad groupings as well: Design (tasks 1 to 6), Production (tasks 7 to 11), and Editing/QC (tasks 12 to 17).

The total estimated manpower is thirty-two man-days per retrofit.

TABLE 1  
MANPOWER REQUIREMENTS FOR INTERACTIVE  
RETROFITTING OF FT. GORDON TAPES  
(BY MODULE)

TEST AREAS	LEVEL A	LEVEL B	LEVEL C	TOTAL
I. Design				
1 <u>Review Content/Existing Course</u>				
2 <u>Define Course Architecture</u>				
3 <u>Write Design Proposal</u>				
4 <u>Create Format Forms</u>				
5 <u>Specify Video/Audio</u>				
6 <u>Specify Maze</u>				
Design Sub-Total	7.5	0	0	7.5
II. Production				
7 <u>Shoot Video/Audio</u>				
8 <u>Master &amp; Edit Video/Audio</u>				
9 <u>Code/Input Video</u>				
10 <u>Adapt Written Materials</u>				
11 <u>Input Written Materials</u>				
Production Sub-Total	3.0	9.0	.5	12.5
III. Editing/QC				
12 Edit all scenes				
13 Build Maze				
14 Edit Maze				
15 Final QC				
16 Final Edits				
17 Deliver Masters to Operations				
Editing/QC Sub-Total	3.0	8.0	1.0	12.0
TOTAL	13.5	17.0	1.5	32.0

## APPENDIX A

### GLOSSARY

## APPENDIX A

### Glossary

Many of the following terms have been coined by or are used in this report in a special fashion by ITS. Underlined terms in definitions are defined elsewhere in the glossary.

- Action Box:** A zone at the bottom of the screen in which a variety of current user options are displayed. The user registers his choice by touching an option.
- Adaptation:** The process of converting a passive video tape to an interactive form.
- Authoring System:** A software system which writes a complex computer program that creates an interactive video show. The user of an authoring system answers questions, and makes choices at a keyboard and does not have to program.
- Conversion:** The process of adapting a passive video tape to an interactive form.
- Flow Diagram:** A graphic depiction of the various parts of an interactive video program and how the user can move from one part to another.
- Format:** A term used to denote a software structure (or learning game) which governs the interaction between the user and the system in order to maximize a particular type of learning.
- Formatting System:** A particular type of authoring system in which one authors in learning exercises (or formats).
- Freeze-Frame:** A special way of displaying video in which a particular frame of video is shown as a still, color image.
- Interactive Video:** A special type of video in which the user can respond to what he is viewing by use of an input device (such as a lightpen, touch screen or keyboard) and control, influence and direct what is displayed next in the video presentation. Typically, the user interacts with a computer program which ultimately controls the display of video images generated by the computer or drawn from a random access video storage medium.

**IRL:** An acronym for Interactive Retrofit Level, an index of the potential for converting a segment of passive video to an interactive form. (There are five IRL levels described in Section III).

**IRL Rating or Grade:** An index (A, B or C) of the presence of key criteria at any given IRL level. (See Section III).

**Maze:** A network of linked scenes (interactive events), typically specified in a flow diagram. A maze describes an interactive environment which a user can explore, the particular interactive events and the possible user movement between them. (For an example see flow diagrams in Section VI).

**Module:** A unit of instruction based on interaction typically structured around a short video segment (10 to 15 minutes) with user interaction time in excess of 1 hour.

**MOS:** U.S. Military acronym for Military Occupational Specialty.

**Passive Video:** Traditional video which plays in a continuous fashion and the user must view in a passive mode, without the possibility of interaction; traditional video.

**Random Access Storage Medium:** A video storage medium, either video tape or video disc, in which any given frame of video can be accessed directly, and therefore, video images can be displayed in any sequence rather than in a fixed linear order.

**Retrofit:** An interactive video show made out of a pre-existing segment of passive video.

**Retrofitting:** The process of converting existing passive video into interactive video.

**Scene:** An event on the video screen, in either video or computer generated images, in which the user has a distinct set of options, and/or objectives in interacting with the system. Scenes are the smallest units used in format authoring.

**SOAC, SOBC:** U.S. Military acronyms for Signal Officer Advanced Course, and Signal Officer Basic Course respectively.

Screen: A text and graphics display which is shown  
until a user interacts with the system.

END